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*The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.*


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[OFFICIAL NOTICES.]

## Representatives of the American Gas Light Association at the International Gas Congress.

AMERICAN GAS LIGHT ASSOCIATION,
SECRETARY'S OFFICE, 58 WILLIAM STREET, N.Y.,
August 21, 1900.

In accordance with the action taken by the Association, at the annual meeting in 1899, the following members have been appointed delegates from the American Gas Light Association to the Congrès International de l'Industrie du Gaz en 1900:

Mr. George G. Ramsdell, Philadelphia, Pa.
Mr. James Ferrier, Columbus, Ga.
Mr. Arthur G. Glasgow, London, England.
Mr. Joseph E. Nute, Fall River, Mass.
Mr. F. H. Shelton, Philadelphia, Pa.
Mr. John T. Westcott, Toronto, Can.
Mr. Walter Wood, Philadelphia, Pa.

ALFRED E. FORSTALL, Secy.

## Representatives of the New England Association of Gas Engineers at the International Gas Congress.

NEW ENGLAND ASSOCIATION OF GAS ENGINEERS,
OFFICE OF THE SECRETARY,
NEW BEDFORD, MASS., July 31, 1900.

Mr. Walter R. Addicks, President of the New England Association of Gas Engineers, has appointed the following members to represent the Association at the International Congress of Gas Engineers, to be held at the Universal Exposition, Paris, France, next month:

Mr. A. B. Slater, Providence, R. I.
Mr. Chas. D. Sherman, New Haven, Conn.
Mr. Walter S. Allen, New Bedford, Mass.

N. W. GIFFORD, Secretary.

## BRIEFLY TOLD.

THE PARIS MUNICIPALITY AND THE GAS QUESTION.—At our invitation, Mr. Edward Couner, of London, England, furnishes the following paragraphs respecting the matter named in the heading:

The Parisian gas dispute is an old-standing one between the Paris Municipal Council and the Paris Gas Company. The residents wish to have their gas at 4 cents per cubic meter, and the Company does not see its way to that solution, but could not the less do so were its own proposals to be accepted. Paris, the "City of Light," is well known to be the most expensive metropolis in the world in which to reside. Everything is dear, gas as well as electricity included. The cause of this may be attributed to the general weight of taxation which has to be borne, to the redemption of former loans, necessary to make the city beautiful, and to further borrowings to complete, as well as to execute new improvements. There, however, seems to be obstinacy on the part of both disputants, since each clings to its own panacea with equal determination. In May, 1899, an important public meeting was held by citizens with the object of considering the situation; it represented 200 trade chambers, or syndicates, consisting of 40,000 members. The gathering unanimously resolved that the price of gas for private lighting purposes ought to be 20 centimes, or four cents, and for motive power three cents per cubic meter. Electricity was to cost 15 cents per 100 watts per hour. The present price of gas is 3, 6 and 7 cents per cubic meter. It was voted that the said reduction should take effect from the 1st January, 1900. It did not; consequently the solution remains as distant as ever, while the prospects of an immediate settlement are not at all within measurable distance. The municipality was to engineer the production, and the supplying of the gas, at reformed rates; to municipalize the scheme, in a word. The Gas Company in Paris is a monopoly, and has ever been so; but its concession expires

on the 31st December, 1905, when it lapses to the municipality; while the electric lighting concession also expires a twelvemonth later. But the Company must be indemnified for its plant, and that means a good many millions of francs to be paid down.

The Gas Company is prepared to make an arrangement on the basis of an extension of its concession for 25 years, from the close of December 1905, and would undertake to agree to a graduated reduction in the price of gas, by spreading it over a series of years. To do so immediately would be impracticable, as it would involve a heavy outlay for additional plant to meet the ever increasing consumption, as well as the sudden demand for cheap gas, and which are matters that cannot be left to sentiment or to the caprice of the Municipal Council. In 1883, the attempt was made by the Prefect of the Seine, who represents the Home Office, to force the hand of the Gas Company. The Prefect decreed that the price of gas should be reduced to 5 cents per cubic meter. A lawsuit ensued, but the Company gained on the main points, and those who refused to pay its tariff were also sued and cast. The Gas Company was not altogether opposed to selling the gas then—in 1883—at the reformed rate of 5 cents, and in time to gradually lower the price in exchange for the extension of its concession for 25 years dating from December 1905. Had the solution been accepted, Parisians would have saved themselves by now an aggregate increase of taxation of some 300 millions of francs. However, the Municipal Council would listen to no proposition which in any way bound up its hands, nor was it certain that the Gas Company would be able to carry out the reduction, or to fix that reduced tariff within a sufficiently short period.

Further, the municipality desired to be absolutely free in the matter, so that it could adopt any new discovery made for the production and the distribution of artificial light. Some cities adopted the principle and acted upon the solution advocated by the Gas Company; to wit, Strasbourg, Mulhouse and Lyons, while Egypt, Spain and Italy did the same. Still, many large cities in France declined to follow suit, and Germany applied the principle to the electric companies in Berlin; they readily extended the concession of their monopolies by some 30 years in order to benefit by an immediate reduction of tariffs. Strasbourg saw her way; she was placed nearly in the same position with her Gas Company as Paris is now. The Company's monopoly would expire at the close of 1907; 15 years ago it accepted the prolongation of its monopoly for 25 years—until 1932. The price of gas immediately fell to 5 cents per cubic meter, and continued to do so until 1890. Then it was reduced to a fraction over 4 cents, this to last until 1st January, 1895; 4 cents were to be charged until 1st January, 1898; a fraction over 3 cents until January, 1915; then less than that again even until the expiration of the concession. The gas consumed by the town, theaters and hospitals pays half the general tariff, while that supplied to industrial establishments is accorded a reduction equivalent to 16 per cent. It is in this direction that the Paris Gas Company would apparently be prepared to move at once.

Another *modus vivendi* has been broached, to form a new gas company, which would pay the municipality 80 per cent., the shareholders 10, and the administration 10 per cent. of net profits. If the company declines, let the Prefect of the Seine then authorize a commission of experts to value the plant of the company; let the gas company also appoint its own expert commission, and in the event of the two commissions not coming to terms, the Prefect of the Seine should at once organize the creation of new gas works. That might not be a solution. It would not be so easy to find room in the city subways for the laying down of duplicate gas pipes and mains, while citizens are in no mood for having the streets torn up, with the object of laying supplementary piping. The actual length of gas pipes in the city is 1,620,765 meters; suburbs, 844,797 meters, or a joint total of 2,465.563 meters—1,000 meters equal 1,093⅔ yards. While the price of gas in Paris is 6 cents per cubic meter, it is 7 cents in the 59 suburbs of the Capital.

In 1899, Paris and its *communes* consumed 325,814,001 cubic meters of gas, or 6 millions more than in 1898; the number of subscribers was 425,276, or 27,636 more than in the preceeding year. The sale of gas amounted to 75,125,117 millions of francs in 1899 for the city, and to 7,505,618 francs for the suburbs. The cost for manufacturing the gas was 26,272,074 millions of francs, to which must be added the payment of factory hands, which amounted to 8,926,054 francs; the lighting, inspection, and the keeping of the pipes in order, cost 5,234,715 francs; office expenses, interest upon and partial redemption of loans, 29,008,879 francs; the remainder was for sundry expenditure, the whole making a grand total of 77¼ millions of francs. The receipts were 104,107,531 francs; this sum included among other revenue, 15 millions of francs for coke and 3½ millions of francs for tar and chemical products. The net profits to divide, amounting to 15,150,000 francs, represented a dividend on the year 1899 of 41.82 and 43.20 francs per share. The price of a share is 1,117 francs. As much as 59 francs per share has been distributed. The Company allocates 1,173,000 francs annually on old age pensions, and succors its employees.

[Official Report.—Revised by the Secretary.—Continued from Page 290.]

## EIGHTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

Held in San Francisco, Cal., July 10, 11 and 12, 1900.

The President introduced Mr. L. P. Lowe, of Passadena, Cal., who read the following paper on

### THE SYNTHESIS OF COMMERCIAL GASES.

The writer desires to preface his remarks by stating that it is his intention to deal with this subject in a very simple and elementary way, refraining, as much as possible, from the use of technical terms, chemical formulae and symbols, feeling, as he does, that it will be thus more comprehensive to those who are in search of a better knowledge of that mysterious and invisible substance commonly known to the civilized world as "gas;" for it may be safely said that, upon the mere mention of the subject, the mind of the average hearer at once reverts to the article which he recognizes as being in common daily use for the purpose of giving light and heat.

In his business it has been the fortune of the writer to visit many gas works, wherein he has met a host of those solid, hard working, good fellows who largely make up the gas fraternity; and during these visits he has, in his talks with many of those connected with the works, been time and again struck with the necessity of a very elementary, simple and practical description of the composition of commercial gases, and from time to time has promised himself the pleasure of undertaking the slight task which he now hopes may prove of assistance to those members of the gas profession, who, after having secured a practical knowledge of gas, desire to familiarize themselves with its chemical properties without being compelled to take up a line of study to which they cannot devote enough time for its mastery in the usual way.

The writer thoroughly believes in the policy of a liberal education, even to the extent of teaching gas consumers what may seen to them the intricacies of the gas business, for nothing tends to make a person more satisfied with any article he is using than a knowledge of its nature and composition. It would, therefore, seem a wise and good business policy for every one connected with the manufacture and sale of gas to have a comprehenstve and explainable understanding in a simple way of the nature of all gases in general commercial use, as they will find it very useful in many ways, and a stepping stone to a broader and deeper study of one of the most important business industries of all civilized ccuntries.

The term "synthesis" has been chosen as meaning the opposite of analysis, the latter being the act of the taking apart or breaking down of a substance, while the former is to assemble or build it up.

It is simple enough for the gas analyst to collect a sample of gas, and, by the various processes at his command to, step by step, analyze or take it apart, which may furnish him with the information sought; but if his labors are performed in the presence of others unskilled in his art, he is able to show but little of what he is accomplishing, taking, as he does, a sample of an invisible substance from which he extracts numerous other invisible substances, finally completing his labors with an announcement of the chemical composition of the gas sample upon which he has been at work, while his observers can do but little else than look wise, accept his statements and keep silent.

Ordinary illuminating or heating gases in a finished, purified state are, in one sense, very simple, and in another sense, very complex bodies, for while but four of the elementary substances, viz., carbon, oxygen, hydrogen and nitrogen enter into the composition of such gases, some of them are combined in almost innumerable forms.

Three of these substances, oxygen, hydrogen and nitrogen, are contained in their natural or free state, while the fourth, carbon, is always found combined with either oxygen or hydrogen. When combined with oxygen it is either in the form of what is known as carbonic acid or carbonic oxide, and when combined with hydrogen is in the form of what is known as marsh gas, or a series of combinations of carbon and hydrogen, which go to make that part of lighting gas commonly known as the "illuminants."

It may simplify matters to briefly explain the difference between chemical substances in their natural or free state and when combined with other bodies, and for this purpose a familiar illustration of a household nature will be used.

Take, for instance, the articles which go to comprise bread, choosing them in their proper proportions, after which, by mixing and baking

them in the usual manner, there will result the familiar loaf of bread, an article which, while containing many substances, in no wise resembles its original component parts and which cannot be mechanically separated and put back into them. These parts may be said to be the elements of the bread, and that article the resulting combination of its parts.

Now, from the same substances which went to make the bread, we can, by altering their proportions, make other kinds of bread, and also crackers, cake, etc., which, while composed of the same materials as the first bread, are recognized as distinctive substances in themselves.

If, for example, we make up batches of several kinds of these articles and cast the whole lot into a suitable receptacle, we can, by proper mixing, prepare a mass all portions of which will average about alike, but which if we attempt to take it apart minutely will be found to consist of our bread, cake, crackers, etc.

Bearing this simile in mind we may now proceed with the consideration of what happens during the process of gas making, and which generally applies to all gas processes alike.

The apparatus being in a working condition, that is to say, in the practical methods of the day, being properly heated, the gas making materials are introduced therein and the evolution of the gas takes place. The materials used are composed of but the four elementary substances above referred to; viz., carbon, oxygen, hydrogen and nitrogen, in either a free or combined state, hence it is that the ultimate composition of the gas is limited to these four substances, which, however, under the action of heat can and do associate themselves into numerous compounds, as in the case of our bread illustration, and which, after they are once formed, are capable of being taken apart only in their new forms.

In gas making the elementary substances, carbon, oxygen and hydrogen, combine with one another as follows: Carbon with oxygen and carbon with hydrogen.

The carbon and oxygen can combine in only two proportions, there being but two compounds of those elements known to chemistry, one of which is commonly called carbonic acid and the other carbonic oxide.

Carbon and hydrogen can and do combine with one another in such an infinite number of forms that, in ordinary commercial gas practice, but two such compounds are usually recognized, one of them being known as marsh gas, while all of the others are grouped under one head and commonly called "illuminants." These illuminants, however, in average compositions, closely resemble another compound of carbon and hydrogen known as ethylene, and for practical purposes they are frequently considered as being that gas. In addition to the above combinations, oxygen, hydrogen and nitrogen are found in their free and uncombined state.

Starting with our four elementary bodies, we have now multiplied them to seven, as follows: 1st, carbon and oxygen to form carbonic acid; 2d, carbon and oxygen to form carbonic oxide; 3d, carbon and hydrogen to form illuminants; 4th, carbon and hydrogen to form marsh gas; 5th, hydrogen in its free state; 6th, oxygen in its free state; 7th, nitrogen in its free state.

In the usual, practical gas analysis of the present day these seven substances comprise the list of the gaseous bodies usually recognized as comprising all commercial gases, their proportions only being varied to make the different kinds of coal, water and producer gases in general use.

From the above it will be seen that, while our original elements have associated themselves to form various compounds, these compounds once in the finished gas retain their individuality and can always be separated as such, showing our completed gaseous body to be merely a mechanical mixture of various chemical substances.

Having thus followed the building up or synthesis of our gas to its ultimate composition, we will now more minutely examine its component parts with reference to both their physical and chemical properties. The determination of the above seven gases in an ordinary gas analysis is in the following order: Carbonic acid, illuminants, oxygen, carbonic oxide, marsh gas, hydrogen and nitrogen, and in this order we will now examine them separately.

*Carbonic Acid.*—Carbonic acid, chemically known as carbon di. oxide, is a colorless, non-combustible gas, having a feeble acid taste and a faint, pleasant odor. It is incapable of supporting either combustion or respiration, a burning match or taper being instantly extinguished if introduced into it, and an animal will speedily die if placed in same. Some authorities claim that it is not directly poisonous, death resulting therefrom merely because of the absence of oxygen, while others state it has a direct poisonous effect upon the system, the prolonged inhalation of air containing only a slightly increased amount having a distinctly lowering effect upon the vitality.

Carbonic acid is a heavy gas, being about 1½ times heavier than air, its specific gravity compared therewith being 1.529, and, because of its great density, it may be poured from one vessel to another much the same as a liquid. If a soap bubble be allowed to fall into a jar containing carbonic acid it will be seen to float upon its surface.

The power of carbonic acid to extinguish fire is very great, this property being taken advantage of in the construction and principle of many of the fire extinguishers in common use, which shows why it is best to have as little as possible of this substance in lighting and heating gases.

Carbonic acid is the gas used in making the familiar soda water, the bubbles rising and escaping therefrom being that gas. It is also the gas known to miners as "choke damp" from which there is great danger to life after mine explosions. Carbon and oxygen combine to form carbonic acid in the approximate proportions of 12 and 32 by weight; thus, in 44 pounds there are 12 pounds of carbon and 32 pounds of oxygen.

In commercial gases, carbonic acid is considered an impurity, and in their manufacture the aim is to always keep its percentage as low as possible, some gas managers going so far as to totally eliminate it by purification, though it is usually found in illuminating gas in amounts of from 2 to 4 per cent.

*Illuminants.*—As previously stated, the illuminants of gas so closely resemble ethylene that a description of that substance will suffice to give a practical idea of the light-giving portions of illuminating gases.

Ethylene, known also as ethene, and more commonly as olefiant gas, is a colorless gas having a somewhat pleasant, ethereal smell. It burns with a highly luminous flame, and can be used for purposes of illumination through small burners in much the same way as acetylene.

Carbon and hydrogen combine to form ethylene in the approximate proportions of 24 and 4 by weight; thus, in 28 pounds there are 24 pounds of carbon and 4 pounds of hydrogen. It is of very nearly the same weight as air, its comparative specific gravity being .971.

The "illuminants" of a gas form one of its most important component parts, being as they are those portions to which is due the illuminating value of lighting gases, such as coal gas, illuminating water gas, oil gas, etc., and to which is also due a very large amount of the heat-giving value of those gases, these illuminants in proportion by volume being by far the greatest heat-giving constituent.

*Oxygen.*—Oxygen is one of the elementary bodies and is a colorless gas having neither taste nor smell. It is slightly heavier than air, its specific gravity being 1.1056. It is only slightly soluble in water, 100 parts of which dissolved but 4.10 of oxygen measured 0° C.

Oxygen is the most widely distributed and abundant element on earth, but it is of little interest in considering the composition of commercial gases, as it is contained in them in only very small proportions, usually from .2 to .4 per cent. in illuminating gases, and may be classed as an impurity, its presence being usually due to a small amount of atmospheric air finding its way in during the process of gas manufacture.

*Carbonic Oxide.*—Carbonic oxide, chemically known as carbon monoxide, is a colorless, tasteless gas, possibly having a faint odor, but upon this point chemists seem to differ. It burns with a pale, blue flame, and is the gas which is seen burning on the top of hard coal, coke or charcoal fires. It is a little lighter in weight than air, its comparative specific gravity being .9678. It is exceedingly poisonous when inhaled, very small quantities present in air rapidly giving rise to headache and dizziness.

The poisonous action of this gas is due to its absortion by the blood with the formation of a bright, red compound known as "carbon-haemoglobin," and blood so charged appears to be unable to fulfil its function of absorbing and distributing oxygen throughout the system.

Carbon and oxygen combine to form carbonic oxide in the approximate proportions of 12 and 16 by weight; thus, in 28 pounds there are 12 pounds of carbon and 16 pounds of oxygen.

Carbonic oxide is of intermediate importance in coal gas, in which it is found in proportions of from 4 to 7 per cent., but in illuminating water gas of from 20 to 30 per cent., there being a still greater proportion in blue water gas, while in plain producer gas it forms the only combustible constituent. Carbonic oxide in percentage by volume is of comparatively little value as a fuel gas, having, volume for volume, only about one-fifth of the heat energy of "illuminants."

*Marsh Gas.*—Marsh gas, chemically known as methane, is a colorless, tasteless, inodorous gas, and burns with a pale, feebly illuminous

flame. It is about one-half as heavy as air, its specific gravity being 0.558. Marsh gas is found in the free state in large quantities in nature, it being one of the products of the decompositions resulting in the formation of coal measures as well as petroleum. The name marsh gas has been given to this compound because of its occurrence in marshy places, owing to the decomposition of vegetable matter, the bubbles of gas which arise when marshes or the bottoms of ponds are disturbed consisting largely of marsh gas. It is also the gas known to miners as firedamp, and natural gas is chiefly composed of it, some of that found in the Ohio and Indiana fields being almost wholly marsh gas, though the California natural gases at Stockton and Sacramento contain much smaller percentages.

Marsh gas is composed of carbon and hydrogen in the approximate proportions of 12 and 4 by weight; thus, in 16 pounds of marsh gas there are 12 pounds of carbon and 4 of hydrogen. Marsh gas is one of the most valuable constituents of illuminating gases, coal gas containing from 35 to 40 per cent., and illuminating water gas from 25 to 30 per cent. It is a most excellent fuel gas, and being contained in light-giving gases in large proportions it constitutes an important heating element therein. Volume for volume it has about two thirds the heating value of "illuminants."

*Hydrogen.*—Hydrogen is one of the elementary bodies, and is a colorless, inodorous, tasteless, inflammable gas, burning with a pale, blue, non-luminous flame, the temperature of which is very high. It is not poisonous, and may, therefore, be inhaled with impunity. Hydrogen is the lightest substance known, its specific gravity as compared with air being 0.0693, and it is but slightly soluble in water, 100 volumes of which take up only 1.93 volumes of hydrogen.

The fact that hydrogen is lighter than air is shown by opening a vessel containing it and turning the mouth upwards, when the gas escapes, and in a very short time no trace of it can be found, and if soap bubbles be made with hydrogen they will rise freely in the air. Hydrogen forms a very important part of almost all commercial gases, it amounting to from 30 to 40 per cent. and sometimes as high as 50 per cent. of ordinary illuminating gas.

While hydrogen is usually considered a very hot gas, its flame temperature being high, it is of low heating value when compared volume for volume with certain other gases, it giving off during combustion only about the same amount of heat as carbonic oxide, which, as stated above, has only about one-fifth the heating value of "illuminants" though, because of its large volume percentage in the gases described, it forms an important part of the heat given by them. Hydrogen in burning unites with the oxygen of the air to form water.

*Nitrogen.*—Nitrogen is a colorless gas without taste or smell, and is slightly lighter than air, its specific gravity compared with that substance being 0.971.

Nitrogen will not burn, nor will it support the combustion of ordinary combustibles. It is not poisonous, but it is incapable of supporting respiration, and is one of the most chemically inert substances known. Nitrogen is contained in illuminating gases in proportions varying from 4 to 8 per cent., and may be classed an impurity, its presence being mostly due, as in the case of oxygen, to atmospheric air finding its way in during the process of manufacture.

One other elementary substance conspicuous in the manufacture of gas has so far been neglected by the writer, viz., sulphur; but as it, in its ordinary forms, is removed by purification, and is not usually considered in referring to commercial gases, a description of its combinations with our other elements is not deemed necessary for the purposes of this paper, as is also the case with ammonia, a compound of hydrogen and nitrogen, which is supposed to be removed from finished gases.

From the foregoing it will be seen that the composition of all such gases as are ordinarily used for domestic or manufacturing purposes may be classed under three distinct heads.

1. Illuminants; containing the light giving portions of the gas.

2. Diluents; hydrogen, marsh gas and carbonic oxide, all combustible, heat-giving gases.

3. Impurities: Carbonic acid, oxygen and nitrogen, all non-combustible substances. The valuable constituents are, therefore, the four substances: Illuminants, hydrogen, marsh gas and carbonic oxide, the varying proportions of which determine the lighting and heating values of commercial gases.

Mr. Lowe, while reading the paper, performed many interesting experiments. Hydrogen, marsh gas, ethylene and carbonic oxide, the four gases which compose ordinary coal gas, were exhibited in large glass bottles, and each gas was lighted in order to show the characteristics of its flame. The gases were then combined in the proper proportions to make commercial coal gas, and the flame produced compared with the flames of the component gases. "It seems strange," said Mr. Lowe in performing the experiment, "that these four gases, only one of which has any odor at all, should produce an illuminating gas that smells so bad. There are a great many combinations possible of hydrogen and carbon, over 200 in all. Some of the combinations have an abominable odor, and to that is due the disagreeable smell of our gas, coupled with the fact that a considerable amount of bi sulphide of carbon is present. But the elementary substances, with the exception of ethylene, are all non odorous, wherefore we might expect a pleasant smelling substance instead of a bad one. Marsh gas would be a poor illuminant burning in a flat flame burner. The Ohio natural gases are almost entirely marsh gas; those in Sacramento and Stockton about 65 per cent. There is a popular fallacy that such a thing as stratification of gases occurs. You may stratify vapors, but there is absolutely no such thing as stratification of gases. Gases do not mix instantly and become an average composition. There is a certain rate of diffusion. Some diffuse rapidly; others slowly. Ultimately they become an average composition. Natural gases mix as perfectly as others. If you put natural gas in a holder and then put in manufactured gas they will take a certain time to mix, but they can be mixed quickly when they are going in—through the station meter, for instance."

*Discussion.*

The President—You have listened attentively to this interesting paper and also to the experiments. When notice of the programme came to me, among the other papers listed I found this special one on: "The Synthesis of Commercial Gases." I was at a loss to know just what the author would present to the Association, but I think Mr. Lowe has made the subject very clear.

Mr. Jones—Mr. Lowe states that producer gas consists entirely of CO. I understand where he got that idea, but it is not strictly correct. In most of the gas producers of the country a little steam is admitted with the air so that there must be a proportion of H mixed with the CO in all producer gas.

Mr. Lowe—I understand that what Mr. Jones says is true, but the combustible constituent of producer gas is supposed to be CO. Referring to most of the technical works you will find that analyses of producer gas refer only to CO. It is true small percentages of hydrogen are present.

Mr. Jones—It is impossible to make it without a percentage of hydrogen.

Mr. Lowe—But I think you will find that in ordinary gas analyses the CO is all that is taken account of.

Mr. Eichbaum—I am very much pleased with Mr. Lowe's paper, and it occurred to me while he was reading it that this paper when it is published, as it will be in our transactions, will be a valuable text book, showing a great many interesting facts in relation to the components of gas, their equivalents and values; not that there is anything new in it, but it brings together a number of interesting pieces of information wihch will make the paper valuable to every one for reference.

On motion of Mr. Eichbaum the thanks of the Association were tendered to Mr. Lowe.

REPORT OF THE COMMITTEE ON OBITUARIES.

The Secretary then read the report of the Committee on Obituaries.

*In Memoriam*—D. E. Knight.—Once more we are called upon to chronicle the departure to the silent beyond of one of our associates; one who by his peculiar characteristics has made himself a record among those who knew him as a true and staunch friend and an open and a generous opponent. Few were his equals in the virtues that we admire in the make up of a man. Connected with the gas business in its infancy on this Coast, in the early 50's, he maintained his connection with it until called away, Friday, January 5th, 1900, up to that time the oldest living representative of the gas industry on this Coast.

Although some months have passed since our friend's departure we desire to place on permanent record the sense of our loss as an Association, and an expression of our deep sympathy with the one who has so long walked with him in his journey through life and who now survives him.

C. E. BURROWS,
T. R. PARKER,
E. C. JONES,
} Committee.

On motion of Mr. Britton it was voted that the report of the Committee be adopted and spread upon the minutes, and that a copy of the resolutions, suitably engrossed, be sent to Mrs. Knight.

Mr. Britton—I would like to call the attention of the Association to the death of another member of the same name. Mr. B. A. Knight, formerly of San Francisco, the agent of the Oregon Pipe and Foundry

Company, who passed away some three months ago, at Los Angeles. He was while here an active member and attended the meetings regularly. While it is probably unnecessary to make formal resolutions, I move that the death of Mr. B. A. Knight be suitably acknowledged by the Association by a memorial page on our minute book. [Adopted.]

ALTERING THE SEAL.

The Secretary—Someone suggested that the seal of the Association be amended by inserting the date of our organization, July 11th, 1893.

Mr. Jones—I think it is a good idea. We should have some means of recalling that date as the years roll by.

Mr. Burrows—Has the Association been incorporated?

Mr. Britton—No, sir. The seal was adopted at the suggestion of Mr. Jones, who presented it as the result of his labors, and with it a little history of his father's connection with the industry with the idea of a continuous pipe symbolizing no dead ends. [The suggestion was agreed to.]

A COMMUNICATION FROM PRESIDENT RAMSDELL.

The Secretary read a letter from Mr. George G. Ramsdell, President of the American Gas Light Association, extending a warm invitation to the Pacific Coast Association to be present in force at the meeting of the American Association, to be held in Denver next October.

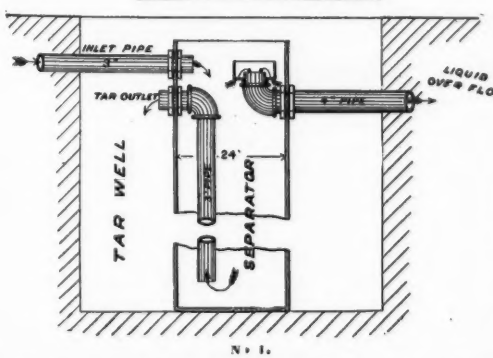
## THE WRINKLES.

Mr. George H. Hollidge, of Mered, Cal., Editor of the Wrinkle Department, read the Wrinkles—on account of the lateness of the hour they were not discussed—his presentation being made in the following preface:

To the Members of the Pacific Coast Gas Association:

Considering that the Pacific Coast has been blessed with an abundance of business this year, it has of necessity involved upon us more care and study, for as other business enterprises thrive so have we all correspondingly received our share. This being the fact, and as almost our whole time and attention were absorbed in the growth of our lighting plants, we have had little or no opportunity to give the attention to this department that we consider it should receive. Nevertheless, we have done all we could do, and the members have responded to the best of their ability; and in presenting their devices to you at this meeting allow me to sincerely thank you for your contributions and kindness. Many of the wrinkles presented at this time were not considered by the inventors worthy of more than casual attention; but they are first-class, and only need to be presented and understood to receive ready imitation and introduction into many works.

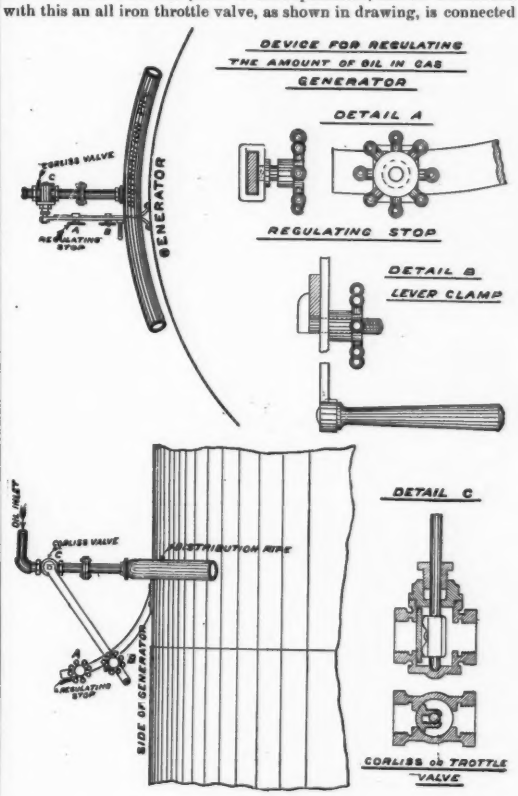
No. 1. *Tar Separator.*—The subject of completely separating tar and ammoniacal liquor has been the cause of much troublesome thought and experiment, as an admixture of tar hurts the quality of the liquor, and ammoniacal liquor is an undesirable quantity in tar. The salient features of this tar separator are shown in the drawing. The inlet pipe for tar and liquor is at the top, while the outlet pipe for tar is from the




No. 1.

bottom of the separator. The overflow pipe for ammoniacal liquor is placed at the same level as the inlet pipe, but around this overflow pipe is placed an open collar, extending below the surface of the liquor, so that the overflow actually takes place at a point below the surface of the liquor, and no light tar passes under the edge of this collar piece into the overflow. This separator has proven very satisfactory and valuable.—A. J. VANDERWHITE, Supt. North Beach Station, San Francisco Gas and Electric Company.

No. 2. *A Device for Regulating the Amount of Oil Used for Enriching Water Gas.*—After long experience with the use of brass valves or cocks on oil pipes, it became evident that the heated oil rapidly attacks the brass, and a remedy is found by substituting all iron stopcocks. These stopcocks were used for regulating the amount of heated oil delivered to different parts of the superheater, and in connection with this an all iron throttle valve, as shown in drawing, is connected




No. 2.

to the main inlet. This valve displaces the old-fashioned globe or gate valve. From the head of this valve extends a lever which passes over a steel quadrant properly marked so that the amount of the valve opening is at all times known. On this quadrant is placed a regulating stop, that may be set at any point on the quadrant, to limit the amount of oil delivered to the superheater.—A. J. VANDERWHITE, Supt. North Beach Station, San Francisco Gas and Electric Company.

No. 3. *Hopper for Charging Hot Coke.*—In Fig. 1 *A* is a wire rope running in front of the benches, on which is placed sheave pulleys *B B*; *C C* are sheave pulleys at end of connecting rods *D D*; *E* is a tie rod. *F* is the hopper at end of chains *I I*. The chains may be made with hooks in order to raise or lower the hopper when the fire boxes are not in line. Fig. 2 is a side view of the hopper. Fig. 3 is a back view of the hopper looking from the bench. Fig. 4 is the hopper, *F* being the receptacle into which the hot coke falls after the charge is drawn, and *G* the mouthpiece which is inserted into the opening of the firebox.

This "charging hopper" is self-explanatory and requires very little description. When it is time for the fires to be filled with hot coke the hopper is run along the wire rope until opposite the firebox to be charged, the lid of the firebox is removed and the mouthpiece, *G*, inserted into the firebox. One man draws the charge from the retort into the hopper, while another pushes the red hot coke into the fire with a small rake, the operation taking about two minutes. When out of use the hopper may be run out of the way along the wire rope,

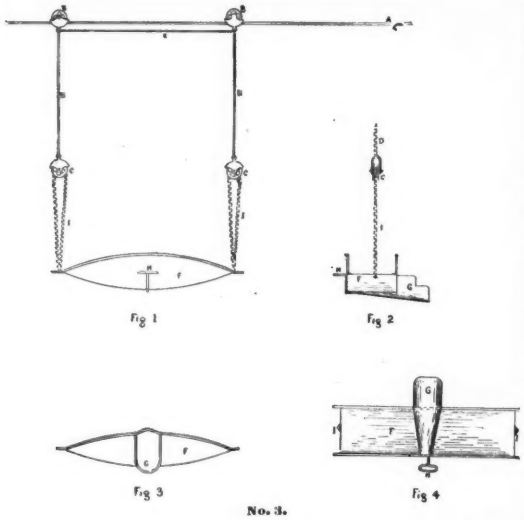
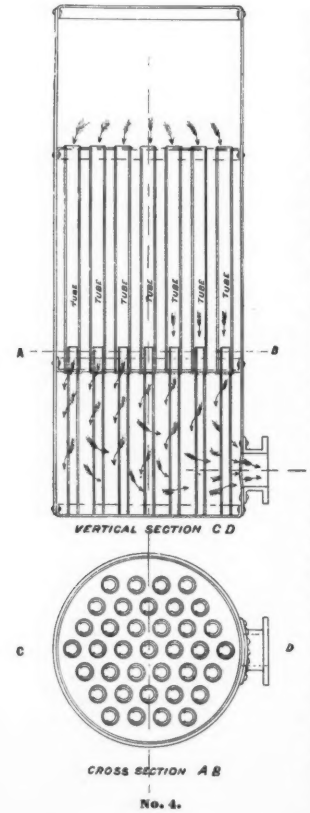


Fig 1 Fig 2

Fig 3 Fig 4

No. 3.

*A.* The hopper is made from sheet iron strap iron edges and handles; each half of the hopper inclining to the center. It is a great labor saver, and the cost is about $30.—W. A. ALDRICH, Spokane Falls (Wash.) Gas Light Company.




No. 4.

No. 4. *Tar Extractor for Tubular Condensers.*—Place in each tube of condenser, at the bottom, a light sheet iron tube that will extend from the bottom of the shell a distance of 4 inches in the tube. Cut the sheet iron in widths three-fourths the circumference of the tube, and 4 inches longer than the distance from the tube sheet to the bottom of the shell, roll to the diameter of the tubes, and spring the open tubes into the condenser tubes, leaving all the open sides turned away from the outlet of the condenser. The tar coming down the condenser tubes is thus kept out of the circulation of the gas and deposited in the bottom of the condenser.—R. L. CLARKE, Supt. San Diego (Cal.) Gas and Electric Light Company.

No. 5. *Tar and Oil Burner.*—The tar and oil burner shown in drawing is made of ordinary pipe and fittings, consisting of 1½-inch tee, bushed for steam and oil as shown, to ¼-inch pipe, the steam opening being flattened as shown in section. A piece of ¼-inch pipe, long enough to reach through bench wall, is screwed into the other opening of the tee, and to this is attached a street L and cap, as shown. In the cap, close to the end, is sawed a slot ¼ inch wide and ¼ its circumference. This burner requir about 15 feet head of oil pressure, or the steam will drive the oil or tar back. Once adjusted it will work very steady with the same steam pressure and will not clog up.—R. L. CLARKE, Supt. San Diego Gas and Electric Light Company.

Nos. 6 and 7. *Graphic Charts Respecting the Operation of a Water Gas Plant.*—Chart No. 1 shows the steam nozzle pressure, the line at 100 being zero, and the radial lines represent 30—the pen was moved to that distance on the chart so the lines might be broadened. This chart gives not only the actual steam pressure at the bottom of the generator, but also gives time of each run and blast and times of all stoppages for barring, coaling or repairs. It is a regular Bristol gauge.

Chart No. 2 is a Bristol water pressure gauge and gives, in addition to the information contained on Chart 1, the actual blast pressure, the effect of steam, and will tell at once of the existence of back pressure in stand pipes, etc. In fact, its uses are so obvious that no detailed description is necessary.—JOHN A. BRITTON, President Oakland (Cal.) Gas Light and Heat Company.

No. 8. *A Tar Burner.*—The illustration represents a tar burner used in our works for a great many years. It was heretofore not considered worthy of a place in a wrinkle column, but as many who of late admired it seemed to consider it quite novel, we risk that possibility—its being considered a novelty.

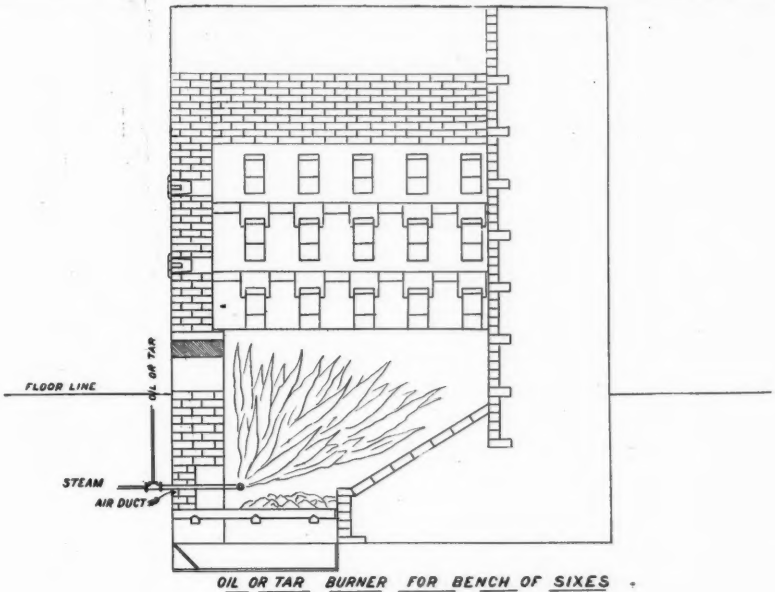
From a tank placed at a suitable height above the boilers the tar runs into a funnel, the supply being regulated by a ¼-inch petcock or stopcock. This arrangement makes it possible to see at all times that the tar flows freely, giving chance to clean both pipes readily. From the point at the end of the funnel, the pipe carrying the tar and the pipe carrying the steam are both inclosed in a larger pipe to superheat the tar, then through the firebox. In turning into the firebox the tar pipe is placed uppermost, and, in dropping down, is met by a jet of steam. In order to make the steam more effective the end of the pipe is flattened out, leaving it of the same area, but reducing the opening to less than $\frac{1}{64}$ of an inch. This spreads the steam, thoroughly distributes the tar over the entire fire bed, and produces a much better combustion. There is by this method a perfect control of the tar and steam, fitting the fire to conditions of demand and producing consequent economies.—JOHN A. BRITTON.

No. 9. *A Cleaning Poker.*—The merits of this device consist in its size and shape. It is used for the purpose of rattling ashes and fine coal through the grate bars of a water gas generater when cleaning. It is made of ¾ inch round iron, with the end turned over, as shown on sketch, and flattened. The outer end is flattened to an edge which permits of its being pushed under fire readily.—JOHN A. BRITTON.

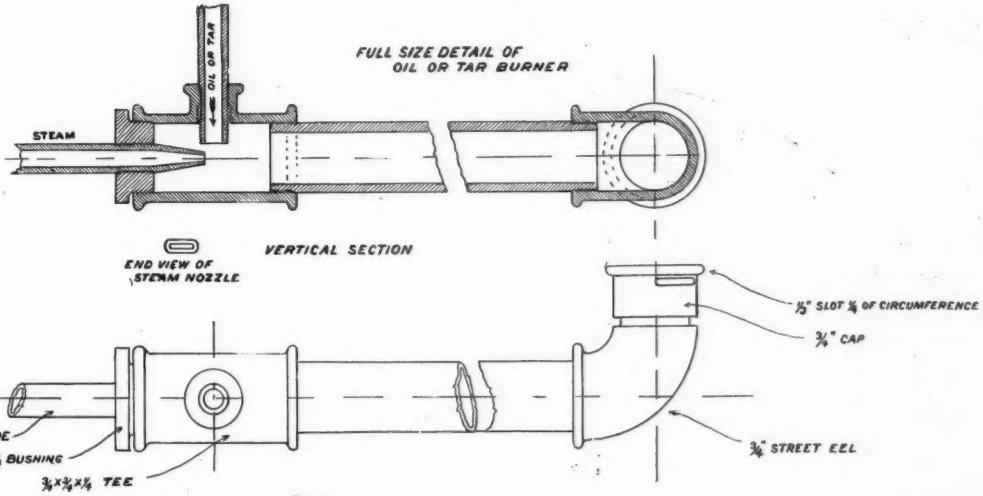
No. 10. *Cast Iron Fitting for Boiler Connections, Adapted for Gas Stoves Particularly.*—To the practical man no explanation of this device is needed. It displaces two brass studs and a wrought iron tee, saves labor and makes a better looking job. The weight is one pound; the tapping and drilling cost approximately three cents, making for total cost of material 7 cents. The brass studs usually employed with fittings cost 40 cents. The saving in joints is also a consideration.—JOHN A. BRITTON.

No. 11. *Device for Cleaning Purifier.*—One will see at a glance that this is a regular apparatus for drawing air through the purifying material in the purifiers. The point is that no valves are used, thus avoiding expense of same and possible leakage through valves after they have been used for awhile. Another point is that as each pipe comes from the bottom of the purifier with only one elbow when the purifier is out of use, we can take off the cap, attach the swinging extension joint of the exhauster and draw the air through it. If anything else is drawn into the pipe one can get at it without difficulty by swinging the joint around opposite some of the other pipes out of the way.—O. M. GREGORY, San Jose (Cal.) Gas and Electric Light Company.

No. 12. *Air Trap to Assist in Correct Registration of Oil Meters.*—The experience of the writer has been that oil meters, such as are commonly used in gas works, do not register correctly, notwithstanding the fact that when tested with water they prove to be accurate. Knowing that some reason must exist for this difference, the writer, in investigating the subject, found that the oil meter in almost universal use by gas companies is so constructed that if air or gas once finds its way into the cylinders it cannot escape therefrom but remains confined




OIL OR TAR BURNER FOR BENCH OF SIXES.
SCALE ½" = 1'

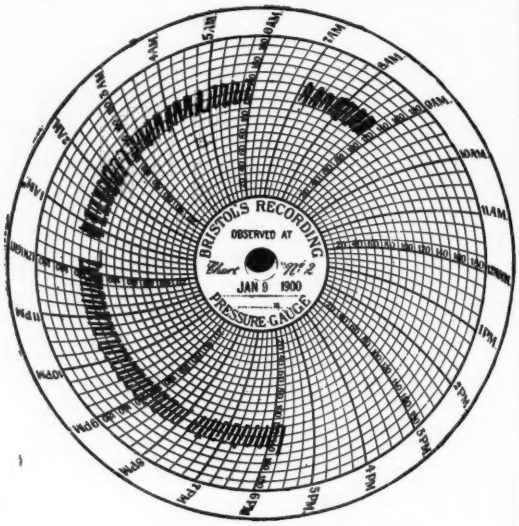



PLAI

No. 1

at the top, thus lessening the capacity of the cylinder and causing incorrect registration, as the recording mechanism is gauged to conform with the measured contents of the meter cylinders, being actuated by the strokes of the pistons working in them. To permit of the escape of any air or gas which may find its way into the cylinders, the meter is provided with pet cocks at its top, and which, if they worked automatically, would accomplish that purpose very nicely, but as they are not so constructed, and gas makers cannot be constantly opening and closing them, the accumulations of gas remain in the cylinders, thus lessening their capacity as described and causing incorrect registration. From the foregoing it will be seen that the use of an automatic air trap would be the best way to overcome the difficulty, but such an article would necessarily be quite expensive. To accomplish the same purpose the writer has designed and uses a device shown in the accompanying drawing. It is a small tank, say 6 inches in diameter by 30 inches high, to which is fitted a gauge glass and various connections, as shown. It is attached as close as possible to t e oil meter, so that between it and the latter instrument evolution of gas is not likely to take place, and the cylinders of the meter are thus kept fully filled with oil. In the use of this trap the oil enters from the top and is discharged from the bottom, any air or gas which may be in the oil being caught and retained at the top of tank, and which, as it accumulates, slowly displaces the body of oil by driving it downward, the progress of which can be seen through the gauge glass on the side of the tank. When the oil line approaches the bottom the air can be allowed to escape from the valve placed on the top of tank, the oil rising as the air escapes. While a tank can be of course of any size, one of the dimensions stated is amply large for use in small gas works, and will generally not require attention more than once or twice a day, sometimes not for several days, as the conditions which cause the presence of air and gas in oil exist intermittently.—L. P. Lowe, Passadena, Cal.

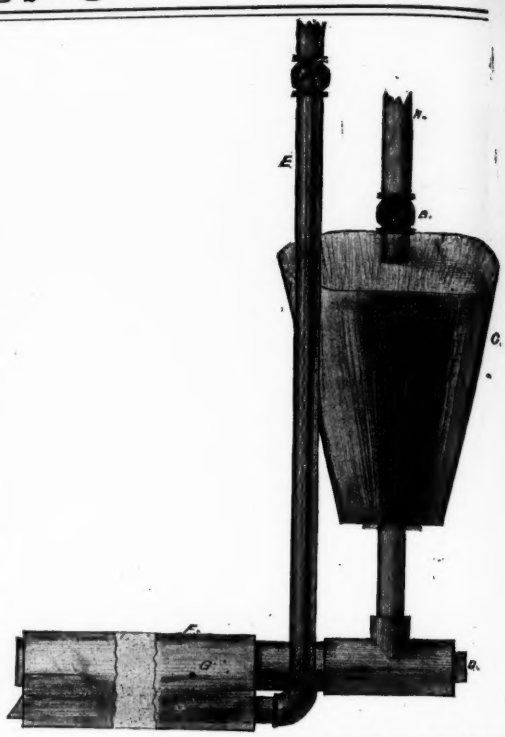
On motion a hearty vote of thanks was passed to Editor Hol-



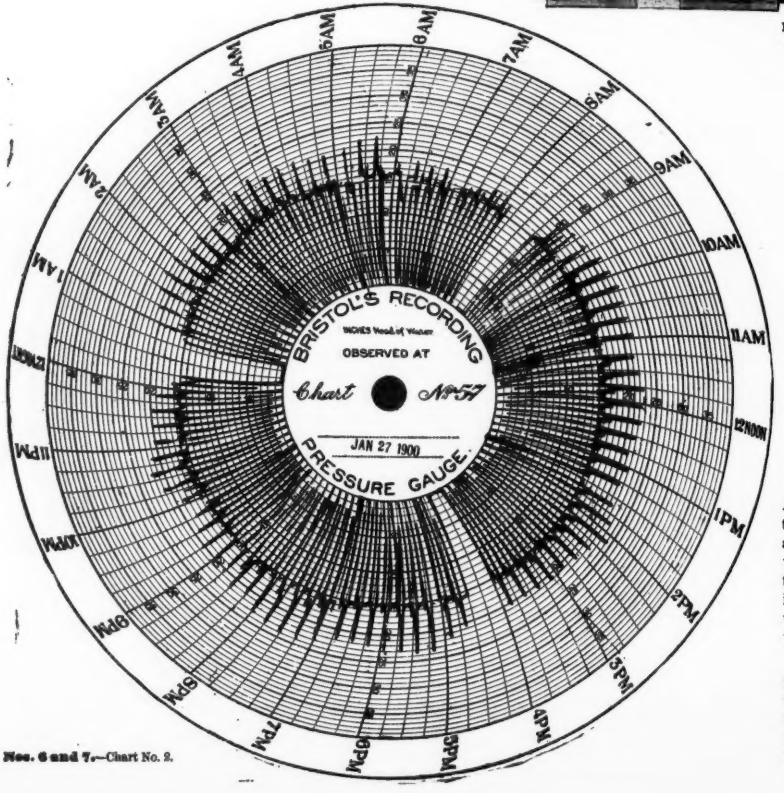

**Nos. 6 and 7.**—Chart No 1.

lidge and to the writers who responded to his invitations for Wrinkles.

Mr. O. M. Gregory, of San Jose, Cal., then read the following chapter of




**No. 8.**—*A*, Tar Pipe from Tank, ⅜-Inch. *B*, Stopcock. *C*, Funnel. *D*, Plug for Cleaning Tar Pipe. *E*, Steam Pipe, ⅜-Inch. *F*, 1¼-Inch Pipe. Jacket for Tar and Steam. *G*, ¾-Inch Tar Pipe.




**Nos. 6 and 7.**—Chart No. 2.

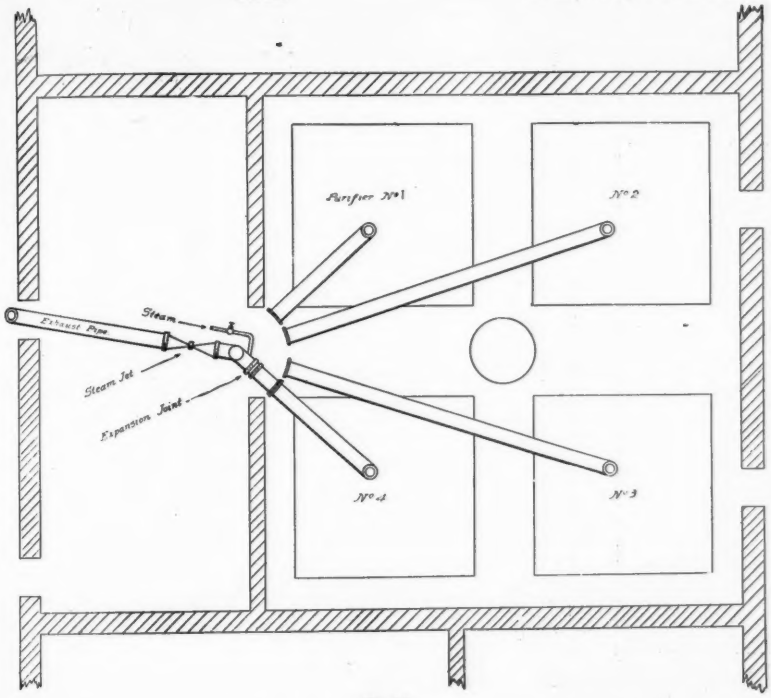
**No. 9.**

## EXPERIENCES.

Mr. President and Gentlemen: Allow me to preface the reading of the "Experiences" contributed by a few remarks on "Experiences" which are intended to encourage the sending of more of them. Here is an extract from the letter of one who sent an "Experience." His words are as follows:

"However, I want to say in passing that if every member responds to your "soft impeachment" the time of the convention will be occupied by experiences; but as you are willing to give your valuable time

No. 10.




No. 11.

to the interests of our Association, the least we can do is to send you something."

I have received only five, but suppose I had received 109, one from each member. Could the Association's time have been better taken up by anything better than experience?

Stop to think of the value of experience and you will all say, "No." There are members who, from lack of time or inclination, never write papers, but whose experience is just as valuable as is that of those who do write long papers.

The Experience Department is instituted for the benefit of those members, that they may give us their information on any subject, in very short papers; or, if they choose, in entirely informal letters.

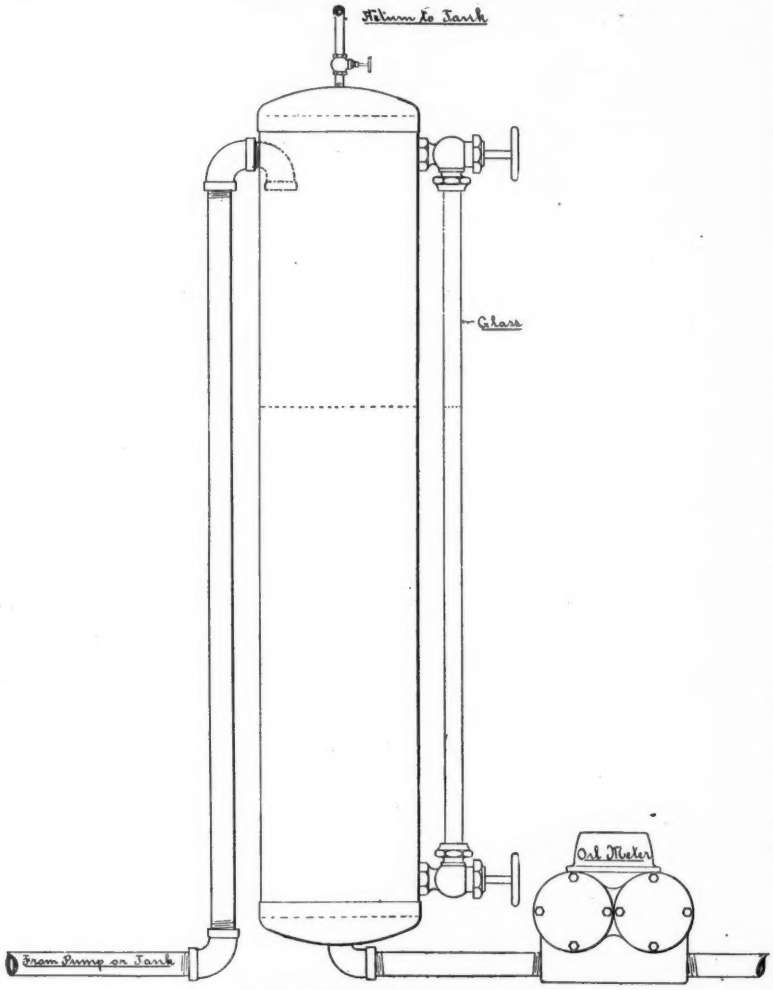
Here is everybody's opportunity. I have tried to make it plain that in this department we may choose our subjects from any part of the gas field. And, with no ill will to my successor, I earnestly hope he will have over 100 short papers collected under the head of experiences at our next meeting. While I am writing I will mention an experience we had in the revivification of iron oxide while in the purifying boxes. We put in a steam jet exhauster and drew the air down through the oxide. We had been cleaning a purifier every day under the old method of taking the material out, and continued to do so under the new method. There was no trouble whatever, and we thought it was the easiest to construct and the nicest working apparatus imaginable. The sugar of lead test was applied as usual and the center seal turned, when the gas from the middle purifier soiled the paper. As the days became longer and the coal charge was cut shorter, there was less sulphur to lodge in the purifiers, and the gas from the middle purifier would not soil the paper for three or four days at a time. Then, after drawing the air through, the material got quite hot. That was not exciting, as I had seen all degrees of heat in purifying material, even to burning a hole through an old wooden floor and setting fire to the studding on the side, but it was violating an important rule, "No smoking in the purifying room."

Then, too, we thought it had a drying effect on oxide which we expected to leave in for some time, and as moisture is needed for that kind of chemical action we had the material sprinkled before lowering the cover. We thought that everything was all right, and even went so far as to say so to ourselves, in order to quiet down a lurking feeling of uneasiness. About this time the charge of coal was cut down still lower and the gas in the middle purifier failed to soil the paper for about two weeks. We then turned the center seal, drew the air through for 2½ hours and set fire to the oxide, with as much apparent deliberation as though it were a part of the business. We got the material out as fast as possible, and I kept the hose pointed wherever I could see a spark of fire or a deal of smoke, but we burned holes through a couple of screens notwithstanding all our efforts. Now, instead of waiting a week or two for the gas in the middle purifier to soil the paper, we exhaust the impurities when the gas in the first purifier soils the paper, which is every day up to the present, but as long as we do not have to move the material the expense is light.

I believe it is impossible to heat the material or get the slightest sign of steam or smoke while changing every day, unless the oxide is new. Any gas works, however large or small, surely cannot afford to run without this kind of apparatus.

*Experience No.* 1.—In reviving oxide of iron in the purifiers, there is no definite time allowed for drawing air through the oxide, as the amount of the sulphuretted hydrogen varies, and the demand on the purifiers is constantly changing. In a gas works running near its capacity it is customary to draw air through the oxide of iron from 2½ to 4 hours at a time, and the necessity for changing purifiers is recognized by the test for sulphuretted hydrogen by sub-acetate of lead. In practice it is found better to change purifiers regularly, regardless of necessity, and subjecting the iron to a thorough revivification by drawing air through it for about three hours. By this means the purifiers are kept constantly in good condition and ready for any excessive demands on them. In reviving oxide of iron which is used to purify coal gas, the material heats considerably in oxidizing, while reviving oxide used for purifying water gas alone does not raise the temperature of the oxide appreciably.

*Experience No.* 2.—This gentleman says: We have a small boiler and clean out our generator every two weeks, raking it out every day, consequently we have considerable generator ashes from the Welsh anthracite coal. Our boiler is too small to utilize them, as the steam will run down even when the ashes are mixed with tar, hence they accumulate into tons. What could I do to rid myself of such a burden? "Happy thought." I would dump a few loads out on the street and wait and watch it. In a week the Chinese had it all in their laundries. All right; I had the queue. I watched; and lo! John Chinaman was using it in the ironing stove to much better advantage than coke. When the Chinaman came to see when I would dump out




No. 12.—Air and Gas Trap for Oil Meter.

some more, I said "Oh, No! That coal is worth $8 per ton." Now I am selling it for $8 per ton to the laundrymen and they like it better than coke. It makes a hotter, better fire, and lasts a long time. This is a very neat way of making a bye-product.

*Experience No.* 3.—I recall at this time only one experience that would be useful to the gas profession, and that is by no means novel or ingenious, but as it may be useful I give it to you for what it may be worth.

The Pacific Gas Improvement Company had a governor in a pit in San Francisco, corner of Market and Battery streets, maintaining 25-tenths pressure against a pressure in an independent main of 40 to 50-tenths. The pipe connecting the governor with the low pressure main needed to be disconnected and capped, as an alteration was required in the connections. The pit was about 7 feet by 9 feet, and 7 feet high; the ladder leading into it from the street level was about 8 feet long.

The foreman and a workman were in the pit and disconnected the pipe by slacking the union joint. As soon as the gas began to come, and before he could stop the flow as he intended, the workman felt himself collapsing and started to get out, which, with the aid of some of our men who were in readiness, he succeeded in doing, leaving the foreman lying unconscious on the floor of the pit. Luckily for him, a peddler from Oakland, a foreigner who knew nothing about gas, who was in the attracted crowd, boldly descended into the pit and lifted the foreman up to the hatchway, where he was seized and laid upon the ground in the fresh air. There he speedily recovered his senses without any disagreeable consequences. The peddler, was, I am glad to say, suitably rewarded for his action in saving the foreman's life.

Meanwhile, I was told the whole story by an employee, and appreciating the danger to be incurred in stopping the flow of gas, and having a 50 foot length of 1 inch hose in the shop, I sent it down, taking with me a mouthpiece of a speaking tube, which I made tight into the end of the hose. Putting this to my mouth and holding it there with my left hand, I descended into the pit and with one hand took the pipes out of the connection and capped them securely. This took about 15 minutes, during which time I took in fresh air through the tube and expelled it through the nostrils, experiencing no difficulty whatever from the gas with which the pit was filled.

Having used the same device many years before this occasion, under circumstances somewhat similar, I was not for one minute at a loss as to what was necessary to be done. I could have remained in the pit for hours, if needed. The main difficulty was to keep the crowd from treading on the hose and to appease the policeman, who insisted upon my coming out instanter and could hardly be restrained from reaching down and dragging me out forcibly.

*Experience No.* 4.—Now an experience; that is, if you think so. I know, I think so. The Spokane people are about erecting an Exposition building, which will cost about $70,000. The money is raised for the building, but the land is not yet paid for. In order to raise the money, the committee in charge hit upon the idea of selling buttons, which would represent one share of stock in the building. These buttons are being sold for $1 each. The public were invited to subscribe for these buttons. Your humble servant, thinking to improve the occasion to advertise the gas stove business, advertised that to the holder of a certain button, with a certain number which was known to only three people, we would present a $20 reliable gas stove and set it up free of charge. I then sat down contentedly waiting for new worlds to conquer. I was congratulated upon the public spirit displayed by the Company, and had a quiet laugh to myself that I had performed a pretty good trick of advertising.

The buttons went off like hot cakes for two days, then the darkness came down swiftly, and the gleaming turned to night. On the third day one of my clerks entered my office and said a gentleman wished to see me on important business. I went to the gentleman, whereupon, he touched me on the shoulder and said, "I am sorry, sir; but I arrest you in the name of the United States for advertising a lottery against the law made and provided."

He asked me if I would accompany him to the Commissioner's Office, where I beheld the managing editor of the morning paper also under arrest. I used to think I was a reputable citizen of Uncle Sam's, but my arrest disposed of this hypothesis. To make a long story short, we were released on our own recognizances the Commissioner saying

he would not think of demanding bonds from gentlemen in such high (*sic*) standing in the community. The United States Attorney would prosecute. When the fatal day arrived for our preliminary trial the prosecuting attorney sent for me and said: He had investigated the matter and found my position was such that he felt sure I had no idea of transgressing the laws of the country, and that he had given instructions not to press the suit against me. Consequently I was discharged without a stain upon my character.

*Experience No. 5.*—One gentleman writes of his experience while unloading oil for a Van Scykel gas plant. He does not state particularly whether he was using petroleum oil or gasoline, but simply speaks of it as a car of oil. It does not matter, as gasoline and petroleum oil will act exactly alike, if you hold a lighted lantern in the top of one car and then go to the other and do the same thing, but you will not go to the other and do the same thing. Once in a lifetime is plenty for any man, and he is a lucky lad whose lifetime is not stopped right there.

Our friend says it was 9 P.M., and he told the great and only all round handyman of the place (every works has one) that he could unload the oil as well as anybody else and went home. Just as he got there and was about to let the cares of the whole works slip from his mind and take some much needed rest, both mentally and physically, he heard a violent explosion presumably in the vicinity of the works. On returning he found the poor fellow who had been unloading the oil in agony, pacing the floor with both hands and face badly burned. He had been blown away off the car to one side and his lantern fell 25 or 30 feet away on the other side. Our fraternal brother closes his experience by suggesting that fire of every description should be kept away from oil cars.

San Jose had a similar experience about 12 years ago, except that then it was a truckman who was burned. He asked for a lantern and the engineer told him not to take the light near the car, but he insisted that he only wanted to see to get around with his team. He got the light and before the engineer could get out to see that the light was kept at a good distance, the truckman tried too see into the car, fired it, burned himself, raised the neighborhood, and caused the people who came in from the country the following day to ask if there had been an earthquake. I would suggest that warning signs be placed on these cars as soon as they come to the works. The man with the lantern should surely be able to see the signs.

*Discussion.*

Mr. Burrows—In our works oftentimes I have noticed that a box shows color when gas is being passed through it, whereas when it is at rest everything shows clean.

Mr. Jones—Sometimes you can overwork purifiers to such an extent that they will bye-pass sulphurretted hydrogen. I have known a case of purifiers built to take care of 3,000,000 feet, where the boxes fouled in a very few hours on a passing ratio of less than 30,000 feet an hour. It was on account of the gas leaking through, taking the easy passage around the rods that hold up the trays and up the sides of the boxes. Very often you will find that a box will be fouled by passing a large quantity of gas and does not really need revivification. You are overtaxing the capacity of your box perhaps for a few minutes only.

Mr. Burrows—My purifying room contains two 4 by 8 boxes. The first one would be foul and the next perfectly clear, so that it could not have been the leakage of gas.

Mr. Jones—It is very important to see that there are no bye-pass ways around the oxide of iron. If the oxide is not tamped down closely the gas will go up that way, or if there is a hollow place in the oxide it will go through that.

Mr. Osborn—It is sometimes convenient to wet the oxide as you are putting it in the pan, otherwise you are not liable to get an even distribution of your water, and that which gets the least water will let gas slip through it. The oxide should always be properly mixed on the floor.

Mr. Lowe—Mr. Burrows, did I understand you to say that your paper was foul when running and not when idle? That would be natural.

Mr. Burrows—When we were laying off when the holder was full, the boxes would show clear.

Mr. Lowe—As the last gas would go through slowly it would get a good purification, and would clean what was apparently a foul box.

On motion of Mr. Jones the thanks of the Association were tendered to Editor Gregory for his clever presentation of "Experiences."

On motion of Mr. Lowe the Association adjourned to reconvene again at 12 o'clock Thursday, at the Tavern of Tamalpais, to conclude the business of the session.

[To be Concluded.]

## A Steam Pipe Condenser and a Glass Tube Oven for the Laboratory Outfit.

Messrs. Streatfeild and Southerden, of the City and Guilds Technical College, Finsbury, England, described, in a recent issue of *Chemical News*, a very clever addition to the working apparatus of a laboratory.

Figure 1 shows the first piece of apparatus as set up for work in the

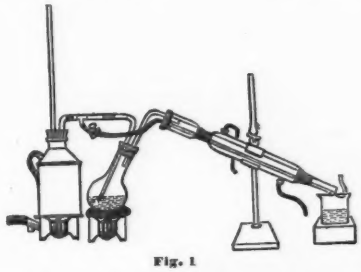


Fig. 1

laboratory. It is intended for the distillation of substances which tend to solidify in the condenser. To obviate this, a glass tube runs the whole length inside, and is connected to the steam generator by a rubber tube and pinchcock. When a block threatens, the cock is opened and the heat from the steam rapidly removes any obstruction.

This method is quicker and more under control than the ordinary one of letting the water out of the condenser. It is necessary that the condenser should possess a wide mouth, so that the two tubes may be readily inserted.

Before proceeding to make a determination of the melting point of an organic compound, it is most essential that any adhering solvent which may have been used in its purification be removed. This may be effected by placing the substance in the water or air oven. If the drying is conducted in a current of hot air, the operation of complete drying is more quickly carried out. The little contrivance seen in Fig. 2 is for this purpose.

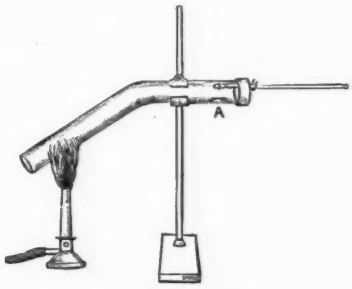



Fig. 2.

A piece of combustion tube about 35 c.m. in length and 18 m.m. internal diameter is bent, as shown, at an angle of 140°. It is clamped with the shorter arm nearly horizontal, and in this is placed the substance (at *A*) on a small piece of drying paper. A wire is twisted round the short arm and bent over the end to form a loop, through which passes a thermometer, the bulb being over the sample. The thermometer maintains its position by its own weight, but to prevent actual contact with the glass tube a piece of fibrous asbestos is wrapped round the bulb. If this is done with wet asbestos no difficulty will be encountered in making it adhere. The substance is dried by a current of hot air produced by the Bunsen burner. This may be placed at any height and at any point along the longer arm, the temperature varying accordingly.

The principal features of the apparatus are that the range of temperature is practically unlimited, and that, without any precautions, the thermometer readings may be kept constant within a few degrees.

With a tube of the above dimensions, the thermometer will always be 10° or 15° higher than the substance, so that the temperature may be safely maintained at its melting-point without fear of melting actually occurring.

## SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Aug. 10, 1900.

*Higher Prices for Gas.—Coal.—Selling Electricity and Selling Gas.*

An advance in the price of gas has now become the general rule, though in a few instances, probably because the price was already sufficient to leave a margin for contingencies, no increase has been made. In such cases, however, the increase is none the less real, for it is obvious that under more favorable circumstances a reduction could have been offered. An undertaking that can do without an increase under the conditions of 1900, could well afford a reduction under the conditions of 1897. Where the price has not been raised it may be taken that a reduction has been postponed. And where the rule is to sell at the lowest possible renumerative price, the increased expenditure, due not only to the increased cost of coal, but also to the rise in iron, lead, copper, and materials generally, to say nothing of labor, is such as to leave no alternative. In a general way the consumers of gas are sufficiently intelligent to perceive this position, and have, therefore, accepted the additional burden in good part, and in a spirit that shows appreciation of the repeated reductions that have been made in the past and that recognizes the desire on the part of sellers of gas to supply a good article at a fair price. A few individuals, however, either from pure cantankerousness, or from the more practical influence of an interest in electric light, or of having some personal object to serve, have attacked the gas interests in the old-fashioned style, with the aid of adjectives of a kind that they would not dare to apply to an individual trader, on pain of not being left long with a whole skin. If an individual is characterized in short expressive terms as being a close family relation of Ananias or of Judas Iscariot, he is apt to make things rather lively for his adversary. But a similar attitude towards a public company is comparatively safe, as the directors or shareholders can well afford to pass it with contempt. Letters have been addressed to that class of the public press that is always open to attacks on vested interests or constituted authorities, and supported by abusive leaderettes, containing suggestions that the increase of price has been attended with an increase of supply pressure or a reduction in quality. Indignation meetings have been called but poorly supported, and the excited utterances of the platform orators have been addressed to comparatively empty benches. These exceptions need not be taken seriously and the general tone shows that the relations between gas companies and their customers are of a satisfactory character, and that the latter do not object to a reasonable rise in price if there is a valid reason to account for it.

There is nothing new to report in the state of the coal market, except that consumers, whether householders or manufacturers, are getting in larger stocks than usual, and while making themselves secure are also playing into the hands of the merchants, by maintaining a brisk demand and, therefore, keeping prices stiff. How far into the autumn or winter this condition of things can be maintained is of course a matter of uncertainty. Meanwhile the fact that most gas undertakings have closed their contracts for the next 12 months and are therefore fixed as regards prices until midsummer, 1901, tends to alter their attitude towards the coal market. Having been cleverly exploited, in common with railway companies and other large users, and forced by combination and other artificial means to pay an abnormally high price, a sudden fall would not be a help to them, but a great misfortune. A rise of one shilling per ton increases the cost of production, approximately, to the extent of three halfpence per 1,000 cubic feet. A 6s. advance on last year's contract rates would, therefore, call for an addition of 9d. per 1,000 cubic feet to the price of gas. But in most cases the rise is only about half the sum thus arrived at, the remainder being accounted for by prospective better sales of coke, and by economies in the matter of repairs, with the reserve fund as a second string.

Coke follows the value of coal to some extent, and a slump in coal would spoil the sales of coke. While fixed to a high price for coal, it would be a great misfortune to be called upon to face a large reduction in the intrinsic value of coke. But this would not be all. The average gas consumer can appreciate the plea of higher prices for coal so long as his current purchases serve to corroborate it. But he can scarcely be expected to appreciate the necessity for yearly contracts and other contingencies incidental to maintaining a regular supply of coal. Directly he finds his own coal bill reduced he argues that if he can get cheaper coal the gas company can also get it, and looks for an immediate proportionate reduction in the price of gas. Further, while he is apt to overlook the effect of the increased cost of coal on the price of gas, that factor becomes prominent when the coal market is falling, and gas companies are asked why, if coal falls 4s. per ton, they cannot make a 6d. reduction, without reference to the fact that the previous increase was probably only 3d. So gas companies have, for the time being, ceased to sigh for cheap coal, and do not object if the present position is continued well on into 1901, or even if prices go higher, so long as their supplies are not endangered. At present gas coal is plentiful and those who are inclined to fill up their coal stores have no difficulty in doing so. But it is astonishing, as many found to their cost at the beginning of the year, what a difficult matter the maintenance of a proper supply of coal becomes, when current market rates run considerably higher than the contract figure. Circumstances at once conspire against the contractor. The miners go on short time, the pumps and other machinery at the mines break down every few days, the railway companies delay the trucks in transit and send them to any place but the right one on the return journey. Other purchasers turn up, holding agreements of such an effective and binding nature that they must be met even if the unfortunate gas company has to go short. The gas interests will be best suited by the maintenance of such conditions as, while not endangering their coal supply, will enable them to do as well with the coke as they are doing now and perhaps better.

The managers of electricity supply companies are increasing their already active attention to the selling department, in the hope of scoring some advantage under present circumstances. From the first it has been evident that electricity could not be depended upon to recommend itself, as was the case with gas, and the question of how to secure customers has always been prominent. The first outlay in establishing the generating works and bringing a supply to the doors of probable consumers is very large, and unless the utmost energy and diligence are applied, the prospects of a dividend for the shareholders are very remote. In dealing with the customers, the cost of wiring and accessories are a great drawback, and behind this is the fact that a bare and naked charge of 6d. or 8d. per unit is a staggerer to those who do not wish to increase their household expenditure, a class that is very numerous in these hard, cutting times. At the beginning, it was not unusual to put a bold face on the matter, and try to brazen it out. The idea that electricity was more costly was said to be an invention, perhaps not of the —— but of the gas company, which was about the same thing. At any rate it was asserted that various indirect savings, such as the increased duration of household whitewashing, paperhanging, and decorations, would more than outset the extra cost. Then a kind of fictitious hostility to gas was trotted out, and people were encouraged to believe that by supporting electricity they were weakening or breaking the chains of the gas monopoly. Fair comparisons as to the relative cost of electricity or gas were simply ridiculed, or met by arithmetical juggling, based upon the very highest results as estimated to be obtainable for the latest developments of electrical science, set side by side with practical tests made upon old fashioned, inefficient burners in a worn out condition with gas. The quality of the products of combustion from gas was so distorted and exaggerated as to make one marvel how it is possible for residents in a house where gas is regularly used, to enjoy anything like a reasonable degree of health, or that gas has been in general use for 70 years, and yet no special disease can be laid to its door. Attempts have been made to trade upon that nervous fear of infections or unwholesome influences which is such a marked feature of modern times. So far, however, these vaporings have no groundwork of fact. Electricity has been used in the luxurious districts at the West End of London for many years, but I have yet to learn that the death rate in that neighborhood has fallen since the period of its introduction, that the services of medical gentlemen are less in request or that house decorators find business slack. But this sort of thing has been dropped in favor of more practical inducements, such as "free" or assisted wiring, and a graduated series of charges such as 8d. for the first hour, 5d. for the second and 2d. for the third. The first hour is just whispered about, the second casually touched ugon, but the advantages of using under third hour conditions are given out in full blast, and the whole thing is explained in such a seductive manner that the customer fails to appreciate the fact that he must pay for 365 hours maximum lighting per annum at 8d., and a second similar period at 5d , before he can secure the somewhat costly luxury of 2d. electricity. It is simply a case of buying a cheap picture on condition of paying an exorbitant figure for the frame.

But all this suggests a question that I have frequently propounded before. If it pays to go to so much trouble and expense to put electricity for the public in an attractive form, why should not similar methods be advantageous if applied to gas? When one sees the energy

and push that are bestowed upon electricity, it is impossible to avoid the conclusion that the average efforts of gas companies in that direction are out of all proportion to the magnitude of their business. Is there any other trade doing so large a turnover that does so little in the way of pushing its wares? The fathering of a trade circular or two, setting forth the advantages of gas in general and of some appliance in particular, the issue of meters and stoves (and occasionally other apparatus) to those who wish to hire, the opening of a show room and an occasional spurt in the way of an exhibition, represent the sum of the operations of a so called "enterprising" gas company, and the average ranges from the whole of this list as a maximum to nothing as a minimum, with a large majority at the bottom end. The sales of gas in England are large, but if half the energy that is being devoted to the sale of electricity could be diverted to gas, the output of that commodity would be more than doubled in a twelvemonth. Many in fact occupy the anomalous position of being afraid to be enterprising because they know a large increase in business would result.

## ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Western Gas Construction Company, of Fort Wayne, Ind., has been awarded a contract for the erection of a set of improved Lowe water gas apparatus for the Austin (Texas) Gas Company. The set is to have a capacity of 250,000 cubic feet per day. The contract also calls for the placing of improved purifying apparatus under the Doherty-Butterworth plans.

MR. JAMES T. LYNN and his associates have purchased the plant and franchises of the Alpena (Mich.) Gas Company, and they will reconstruct the works. They also have determined to extend the main system to the north side of Thunder Bay River, which suburb has a population of not less than 3,000. The name of the corporation has been changed to that of the Alpena Gas Light Company, and it is capitalized in $75,000. Its officers are: Directors, Elwood T. Hance, H. J. Lesher, James T. Lynn and Eugene T. Lynch, of Detroit, and W. L. Churchill, of Alpena; President, James T. Lynn; Vice-President, H. J. Lesher; Secretary and Treasurer, Eugene T. Lynch.

THE Omaha (Neb.) Gas Engine and Motor Company has confessed its insolvency.

THE authorities of Galesburg, Ills., have authorized the construction of an electric lighting plant to be operated on municipal account. The plant is to have a capacity of 250 arcs, each of the nominal candle power of 2,000. It is not proposed to supply any lamps on commercial account.

THE Directors of the Laclede Gas Company, of St. Louis, Mo., have declared a dividend of 2 per cent. on the common stock, payable the 25th prox.

A CORRESPONDENT forwards the following from Harrisburg, Pa., under date of August 17th: "Mr. William G. Chandler, local Agent and Superintendent of the Harrisburg Gas Company, died the morning of the 14th inst., after an illness of 10 days, at his late residence, 1625 Penn street, Harrisburg. Deceased had been a citizen of Harrisburg for many years. He was a man of fine business qualities and was a most companionable and genial gentleman. He is survived by his wife and a brother, Mr. George P. Chandler. The funeral services were held the afternoon of the 17th inst., and interment was made in the Harrisburg Cemetery."

MR. JOHN H. BATEMAN, a Director in the Bay State Gas Company of Delaware, died at his home in Dover, Del., the afternoon of the 17th inst. He was in his 71st year.

THE Mohawk Gas Company, of Schenectady, N. Y., has notified its customers that their next quarterly bills will be made out on the basis of $1.60 per 1,000 cubic feet less 30 cents per 1,000 for prompt payment. This is equivalent to an increase of 10 cents per 1,000.

THE proposition submitted by the Armitage Manufacturing Company for the purchase of the ammoniacal liquor produced on the plant of the Richmond (Va.) Municipal Gas Works was rejected. New bids have been advertised for.

THE Burlington (N. J.) Gas Company proposes to extend its mains to and through the outlying district of Beverly.

SUPERINTENDENT SCHWARM, of the Lorain (Ohio) Gas Company, reports a great increase in the gas sendout. He is quite a busy man just now, directing the construction of notable additions to the plant, both as to its generating and distributing divisions.

MR. ALLEN SHEWMON has been granted a franchise for the construction and operation of a gas works at Great Falls, Montana.

GAS was turned into the mains of the Manchester (Va.) Light, Heat and Power Company about a fortnight ago. The starting of the works was made without a hitch.

THE capital stock of the Malden and Melrose (Mass.) Gas Light Company has been increased to $335,000, an addition of 35,000.

SUPERINTENDENT DUNBAR, of the Pittsfield (Mass.) Coal Gas Company, is making a visit of inspection to several gas works with a view to determining what his plans shall be in connection with the proposed reconstruction of the Pittsfield plant.

THE contract for the public lighting of Freehold, N. J., for the ensuing year both on gas and electric account, has been awarded to the Freehold Gas Company.

THE Waukegan (Ills.) Gas Company will extend its mains to the outlying district known as Lake Forest.

THE authorities of Louisville, Ky., are in treaty with the Louisville Gas Company for the purchase from the latter of the plot owned by it at the corner of Sixth and Green streets. The city proposes to erect an armory over the named site.

THE new office building for the Knoxville (Tenn.) Gas Company will be ready for occupancy by November 1st.

A CORRESPONDENT forwards the following: "The installation of the steam heating plant and the various improvements on the works of the Grand Forks (N. D.) Gas and Electric Company have kept Manager Roycraft on the jump this summer. The new switchboard that is being installed there is the finest northwest of the Twin Cities. It is arranged on an immense marble slab, 6 feet high and 12 feet wide, and is as elegant, convenient and complete as such a device can be made. The boilers are in place and will be ready for operation in a very short time, not later than the 1st of September. They have a capacity of 700-horse power. No expense is being spared to make the plant one of the most complete in the country, and the appliances are all of the latest pattern and up-to-date in every respect. The connections between the steam mains and the buildings on Third street are being rapidly pushed and will soon be completed. The schedule of prices to be charged by the Steam Heating Company has not yet been made, but its appearance cannot be much longer delayed."

DR. MOSES WARREN KIDDER, of Lincoln, Mass., died at the Waltham Hospital, the afternoon of the 15th inst. He was the inventor of the Kidder process for the manufacture of illuminating gas, which, however, was not much of a success. Deceased was in his 72d year.

MR. WALLERSTEIN, of the Richmond (Va.) City Council, insists that the rate for gas used there on illuminating account shall be put at 80 cents per 1,000. It is likely that his proposition will be assented to at the next meeting of the Council.

THE differences between the Brockton (Mass.) Gas Company and its men have been satisfactorily settled.

A CORRESPONDENT at Paris, Ills., forwards the following, under date of August 18th: "A called meeting of the City Council of Paris was held August 13th for the purpose of granting a new franchise to the Paris Gas Light and Coke Company. The provisions of the ordinance had been pretty thoroughly discussed at a previous meeting and the main points agreed upon. The whole ground was again carefully gone over, however, the City Attorney reading the ordinance, which was taken up section by section and various verbal amendments made looking to the elimination of any uncertainty of construction which might afford ground for future trouble. The construction of the hot water heating system is made a condition for the grant of the lighting franchise, it being specified that the work is to begin within a stipulated period, and at least one mile of pipe laid before the end of the present year. Mr. Z. E. Powell, who is in charge of the enterprise, says that he has already contracted for the necessary pipe, and that he will begin active operations within three weeks. One stipulation in the

grant is that the city building and the fire station shall be heated and lighted free of charge. The rate schedule for a gas and electric lighting supply is virtually the same as that I formerly forwarded you, the main amendment to it being a clause to the effect that the maximum rate for gas after 1903 is to be $1.50 per 1,000 cubic feet for all purposes. The granting of the new franchise, moreover, is attended with the absolute repeal of all previous franchises, so that the grant is to be considered an entirely new one and not as an extension of rights heretofore possessed."

THE Beverly (Mass.) Gas and Electric Company has officially promulgated its new selling schedule to go into effect October 1st. Under it gas will be charged at the rate of $1.70 per 1,000, less 20 cents per 1,000 for prompt payment. Current for incandescent electric lights is put at 20 cents per 1,000 watts, less 10 per cent. for prompt payment.

THE Common Council of Poughkeepsie, N. Y., has awarded a five year contract for the public lighting of that place to the Poughkeepsie Electric Light Company. The rate is $89 per lamp per annum, on a partial moontable.

THE Poughkeepsie (N.Y.) Gas Company has reduced its gross rate for an illuminating supply to $1.50 per 1,000 cubic feet.

A CORRESPONDENT forwards the following from Baltimore, Md., under date of the 18th inst.: "Advices from Charleston, S. C., state that Mr. Francis K. Carey, of Baltimore, has resigned as President of the Charleston Consolidated Railway, Gas and Electric Company. This is the Company formed by Baltimore capitalists and financed by the Baltimore Trust and Guarantee Company. As its name indicates, it embraces a consolidation of the railways, gas and electric light properties of Charleston. A special dispatch to *The Sun* from Charleston last night says: Mr. S. H. Wilson returned to Charleston to-day and confirmed the statement that he had been tendered the Presidency of the Charleston Consolidated Railway, Gas and Electric Company, to succeed Mr. Francis K. Carey, of Baltimore. Mr. Wilson has been given 30 days in which to formally accept or decline the offer. The fact of Mr. Carey's resignation has caused a flutter of excitement in business circles here. He took charge of the concern after the death of President J. S. Lawrence, formerly of Baltimore, and he has rendered valuable service to the Company in getting it over difficult places which were met in the regular run of business affairs. Mr. Carey has resigned, it is said, because he found it too inconvenient to remain in Baltimore and manage the affairs of the Company in Charleston, and it was thought by him that a Charleston man could do the work more satisfactorily, now that the Company has been put on a sound footing. Baltimore capital developed the railway and lighting interests in Charleston and nearly all of the backing came from Baltimore capital. It has been said here that President Carey was not altogether satisfied with the reception given his Company by the new City Council of Charleston, for at one of the late Council meetings an effort was made to have a lighting plant included in the scheme to bring water to Charleston from the Edisto river, a distance of 30 miles. This was a move in the direction of municipal ownership, and the Baltimore capitalists did not believe or consider it the just thing to try to include a lighting plant in this scheme when the Consolidated Company had expended more than $100,000 in the erection of a new lighting plant for the city. Mr. Carey, it is understood, will remain a member of the Board and will still give his friendly influence to the city where so much Baltimore money is invested."

THE *Gas World* says that the suitability of the gas engine as a means of producing electricity was discussed at a meeting of the Municipal Electrical Association, held at Huddersfield, England, last June. A statement made in the discussion that gas engine stations are failures has been taken exception to by Mr. D. H. Irwin, a Director of Messrs. Crossley Bros., Limited, who has written to the *Electrician* on the subject. Mr. Irwin says that because a few stations have been unsuccessful, for reasons which can be easily explained and obviated, it is hardly fair to argue that gas engine driven stations must of necessity be failures. He enumerates various stations, both at home and abroad, at which gas-driven plants erected by his Company are working satisfactorily, and continues: "As a proof that a gas engine when properly designed is as reliable as a steam engine for long runs at full power we may mention that one of our 150-horse power engines, coupled direct to a dynamo, ran for 8,640 hours and 25 minutes last year out of a possible 8,960 hours, or 98.6 per cent."

## The Market for Gas Securities.

The market for city gas shares during the week showed considerable animation, with a particularly good demand for Consolidated, which sold up to 176⅞ as the high point. The opening to-day (Friday) was made at 177 to 177¼, but later on realizing sales caused a rather sharp break. Shortly before the close 175 was bid. The eagerness with which the rights were taken up must have been rather discouraging to the gentlemen of the City Bank, who undoubtedly hoped that a very much larger lot of "rights" would come to them than those actually obtained. It is useless to speculate now concerning the next positive move, but it is fair to presume that will be made the first week in October. Amsterdam 5's are in good demand. Mutual shows no change, at least as far as the nominal quotations go.

Brooklyn Union is inactive, but it is very firmly held. Peoples, of Chicago, is on the declining list, without any good reason there for. Cincinnati gas keeps going on to its former high level, and Baltimore Consolidated also shows marked gains. That stock, if undercurrent indications may be trusted, will be not far from 70 by January 1st.

## Gas Stocks.

**Quotations by George W. Close, Broker and Dealer in Gas Stocks.**

16 WALL STREET, NEW YORK CITY.

AUGUST 27.

☞ All communications will receive particular attention. ☜ The following quotations are based on the par value of $100 per share.

| *N. Y. City Companies.* | *Capital.* | *Par.* | *Bid.* | *Asked.* |
|---|---|---|---|---|
| Consolidated—Ex rights | $4,595,300 | 100 | 174¾ | 175½ |
| Central Union, Bonds, 5's. | 3,000,000 | 1,000 | 103½ | 105 |
| Equitable Bonds, 6's | 1,000,000 | 1,000 | 105 | .. |
| " 1st Con. 5's | 2,300,000 | 1,000 | 120 | .. |
| Metropolitan Bonds | 658,000 | .. | 108 | 112 |
| Mutual | 3,500,000 | 100 | 305 | 320 |
| " Bonds | 1,500,000 | 1,000 | 100 | 102 |
| Municipal Bonds | 750,000 | . | .. | |
| New Amsterdam Gas Co. | | | | |
| Bonds, 5's | 11,000,000 | 1,000 | 106 | 106¾ |
| Northern Union, Bonds, 5's. | 1,250,000 | 1,000 | 95 | 97 |
| New York and East River. | | | | |
| Bonds 1st 5's | 3,500,000 | 1,000 | 109 | 111 |
| " 1st Con. 5's | 1,500,000 | | 115 | .. |
| Richmond Co., S. I. | 348,650 | 50 | 70 | .. |
| " Bonds | 100,000 | 1,000 | . | |
| Standard | 5,000,000 | 100 | 121 | 125 |
| Preferred | 5,000,000 | 100 | 141 | 145 |
| Bonds, 1st Mortgage, 5's | 1,500,000 | 1,000 | 116 | 114 |
| Yonkers | 299,620 | 500 | 130 | |
| *Out-of-Town Companies.* | | | | |
| Brooklyn Union | 15,000,000 | 100 | 168 | 174 |
| " " Bonds (5's) | 15 000,000 | 1,000 | 116 | 119 |
| Bay State | 50,000,000 | 50 | 1 | 1¼ |
| " Income Bonds | 2,000,000 | 1,000 | | 75 |
| Binghamton Gas Works | 450,000 | 100 | 23½ | 30 |
| " 1st Mtg. 5's | 475,000 | 1,000 | 96½ | 99½ |
| Boston United Gas Co.— | | | | |
| 1st Series S. F. Trust | 7,000,000 | 1,000 | 82 | 85 |
| 2d " " " | 3,000,000 | 1,000 | 47½ | 50 |
| Buffalo City Gas Co. | 5,500,000 | 100 | 4 | 6¾ |
| " " Bonds, 5's | 5,250,000 | 1,000 | 64 | 67 |
| Capital, Sacramento | 500,000 | 50 | .. | 85 |
| Bonds (6's) | 150,000 | 1,000 | .. | .. |
| Central San Francisco | 2,000,000 | .. | 105 | 108 |
| Chicago Gas Co. Guaranteed Gold Bonds | 7,650,000 | 1,000 | 104 | 104¼ |
| Cincinnati G. & C. Co. | 8,500,000 | 100 | 199¾ | 201 |
| Columbus (O.) Gas Co., 1st Mortgage Bonds | 1,207,000 | 1,000 | 106 | 107 |
| Columbus (O.) Gas Lt. & Heating Co | 1,682,780 | 100 | 60 | 65 |
| Preferred | 3,026,500 | 100 | 84 | 86 |
| Consumers. Jersey City Bonds | 600,000 | 1,000 | 102 | 105 |
| Consumers, Toronto | 1,700,000 | 50 | 230 | 235 |
| Consolidated, Baltimore | 11,000,000 | 100 | 55 | 56¾ |
| Mortgage, 6's | 3,600,000 | .. | .. | 118 |
| Chesapeake, 1st 6's | 1,000,000 | .. | .. | .. |
| Equitable, 1st 6's | 910,000 | .. | .. | .. |
| Consolidated, 1st 5's | 1,490 000 | .. | .. | 112 |
| Consolidated Gas Co. of N.J. | 1,000,000 | 100 | 12½ | 15 |
| " Con. Mtg. 5's | 380,000 | 1,000 | 82 | 86 |
| Consolidated G. & E. Co.'s., Little Falls, N.Y. | 90,000 | 100 | .. | 100 |
| Bonds | 75,000 | .. | .. | 100 |
| Detroit City Gas Co. | 4,560,000 | 50 | 95 | 97 |
| " Prior Lien 5's | 4,598,000 | 1,000 | 99¼ | 100 |
| Detroit Gas Co., 5's | 386,000 | 1,000 | 100 | 101 |
| " Inc. 5's | 16,000 | 100 | 94 | 94½ |
| Equitable Gas & Fuel Co., Chicago, Bonds | 2,000,000 | 1,000 | .. | 101 |
| Essex and Hudson Gas Co. | 6,500,000 | .. | 35 | 40 |
| Fort Wayne | 2,000,000 | .. | 35 | 41 |
| " Bonds | 2,000,000 | .. | 60 | 64 |
| Grand Rapids Gas Lt. Co. | 1,000,000 | 50 | .. | .. |
| " 1st Mtg. 5's | 1,125,000 | 1,000 | .. | .. |
| Hartford | 750,000 | 25 | .. | 230 |
| Hudson County Gas Co., of New Jersey | 10,500,000 | .. | 25 | .. |
| " Bonds, 5's | 10,500,000 | .. | 101 | 103 |
| Indianapolis | 2,000,000 | .. | 70 | 80 |
| " Bonds, 6's | 2 650,000 | .. | 100 | 104 |
| Jackson Gas Co | 250,000 | 50 | 70 | 75 |
| " 1st Mtg. 5's | 250,000 | 1,000 | 101 | 103½ |
| Kansas City Gas Light Co., of Missouri | 5,000,000 | 100 | .. | 36 |
| Bonds, 1st 5's | 3,822,000 | 1,000 | 101½ | 103 |
| Laclede, St. Louis | 7,500,000 | 100 | 74½ | 75 |
| Preferred | 2,500,000 | 100 | 96 | 99 |
| Bonds | 10,000,000 | 1,000 | 110 | 110½ |
| Lafayette Gas Co., Ind. | 1,000,000 | 100 | 35 | 40 |
| Bonds | 1,000,000 | 1,000 | 60 | 65 |
| Louisville | 2,570,000 | 50 | 110 | 120 |
| Madison Gas & Elec. Co. | 400,000 | 100 | 70 | 75 |
| " 1st Mtg. 6's | 350,000 | 1,000 | 102½ | 108 |
| Montreal, Canada | 2,000,000 | 100 | 182 | 184½ |
| Newark, N. J., Con. Gas Co | 6,000,000 | .. | .. | 55 |
| Bonds, 6's | 4,600,000 | .. | .. | 108 |
| New Haven | 1,000,000 | 25 | 280 | 300 |
| Nashville Gas Lt. Co. | 1,000,000 | 50 | 110 | .. |
| Oakland, Cal. | 2,000,000 | .. | 46 | 47 |
| " Bonds | 750,000 | .. | .. | .. |
| Peoples G. L. & Coke Co., of Chicago | 25,000,000 | 100 | 93¾ | 96 |
| Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage | 20,100,000 | 1,000 | 111¾ | 111¾x |
| 2d " | 2,500,000 | 1,000 | 104 | 105 |
| Rochester Gas & Elec. Co. | 2,150,000 | 50 | 88 | .. |
| Preferred | 2,150,000 | 50 | 118 | .. |
| Consolidated 5's | 2,000,000 | .. | 87½ | 90 |
| San Francisco, Cal. | 10,000,000 | 100 | 47¼ | 47½ |
| St. Paul Gas Light Co. | 1,500,000 | 100 | 49½ | 50 |
| 1st Mortgage 6's | 650,000 | 1,000 | 82 | 85 |
| Extension, 6's | 600,000 | 1,000 | .. | .. |
| General Mortgage, 5's | 2,423,000 | 1,000 | 88 | 90½ |

| | | | | |
|---|---|---|---|---|
| St. Joseph Gas Co. | 1,000,000 | 100 | 30 | 34 |
| " 1st Mtg. 5's | 750,000 | 1,000 | 98½ | 98 |
| Syracuse, N. Y. | 1,750,000 | 100 | | 15 |
| Bonds | 1,612 000 | 1,000 | 88½ | 93 |
| Washington, D. C | 2,600,000 | 20 | 270 | 271 |
| First mortgage 6's | 600,000 | .. | .. | .. |
| Western, Milwaukee | 4,000,000 | 100 | 95 | 98 |
| Bonds, 5's | 3,830,500 | . | 104 | 106 |
| Wilmington, Del. | 600,000 | 50 | 200 | 210 |

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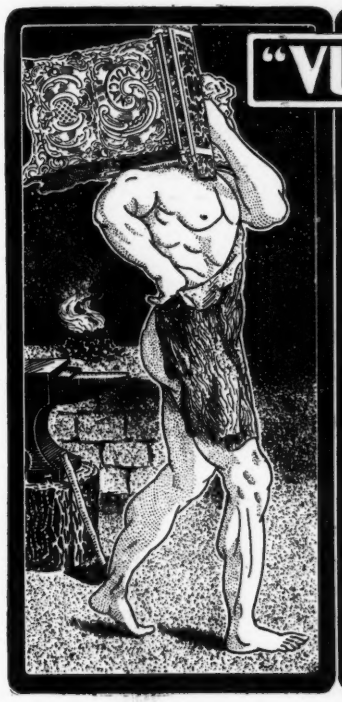

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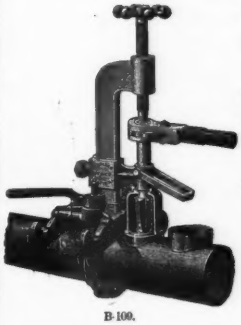

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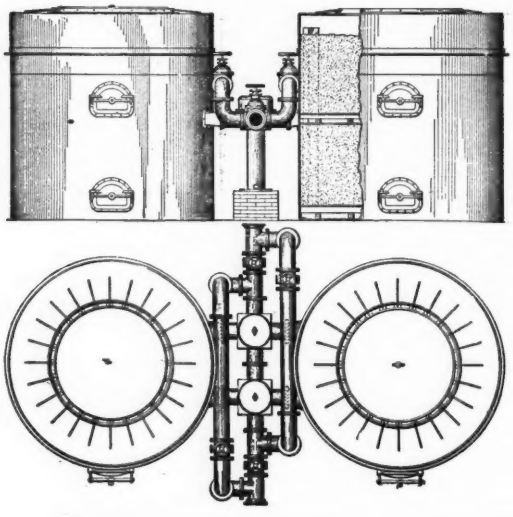

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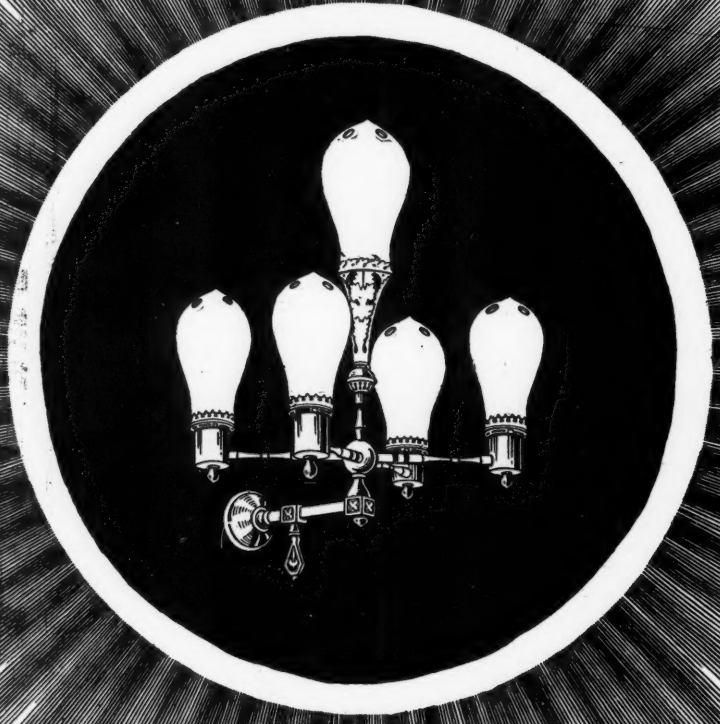
Herkimer, N. Y., 2 orders.
Little Falls, N. Y.
Fishkill-on-Hudson, 2 orders.
Clifton Springs, N.Y., 2 orders.
Green Bay, Wis.
Stevens Point, Wis.
Tarrytown, N.Y., 3 orders.
Ft. Henry, N. Y.
Gainsville, Fla.
Hollidaysburg, Pa.
Waterville, N. Y.
Huntington, L. I.
Lexington, Mo.
Mendota, Ill.
Circleville, O.
Joplin, Mo.
Ashville, N. C.
Youngstown, O.
Kingston & Rondout, N. Y.

CORRESPONDENCE SOLICITED.

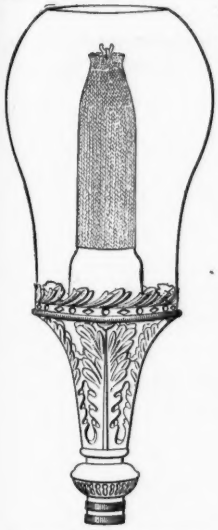
# KERN

## INCANDESCENT GAS LIGHT CO.



18 MURRAY ST.,

NEW YORK.



# Kern Incandescent Gas Light Company's Systems.

NO CHIMNEY. NO BREAKING GLASS.
NO BLACKENED MANTLES.

CAN BE USED WITH

**Manufactured Gas, Non-Carburetted Gas, Natural Gas or Gasoline Gas.**

35 TO 40 CANDLES PER CUBIC FOOT.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Burner No. | 0 | consumes | 8/10 | cu. ft. | . | 30 | candle power. | Burner No. | 3 | consumes | 3 cu. ft. . 105 candle power. |
| " | 1 | " | 1 | " | . | 35 | " " | " | 4 | " | 4 " . 140 " " |
| " | 2 | " | 2 | " | . | 70 | " " | " | 7 | " | 7 " . 225 " " |

**Prices Reasonable. Catalogues on Application. Agents Wanted.**

## KERN INCANDESCENT GAS LIGHT COMPANY,

18 MURRAY STREET, NEW YORK.

## Steward Burners.

Closest Attention to **Durability, Candle Power, Finished Appearance.**

**Samples to be Had for the Asking.**

Write for neat vest pocket memorandum book. Sent Free.

**The D. M. Steward Mfg. Co.,**

New York Office, 107 CHAMBERS ST. CHATTANOOGA, Tenn.

## BRAY BURNERS.

WILLIAM M. CRANE COMPANY,
SOLE AGENTS FOR UNITED STATES,
1131-1133 Broadway, New York.

THE THOMAS DAY COMPANY,
Distributing Agents for Pacific Coast,
San Francisco, Cal.

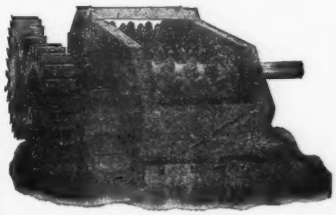
## SAFETY GAS MAIN STOPPER CO.

108 EAST 117TH ST., N. Y.

FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS

## THE LINK-BELT MACHINERY CO.,

ENGINEERS, FOUNDERS, MACHINISTS,
Chicago, U. S. A.



"Link-Belt" Breaker.

**LINK-BELT** ELEVATING & CONVEYING MACHINERY for HANDLING COAL, COKE, OXIDE, ETC.

Tilting Coal and Coke Cars,
Breaker Rolls, Shaking Screens,
Power Transmitting Machinery.

Machinery designed and erected to suit existing conditions and available space.

CATALOGUE UPON APPLICATION.

# AMERICAN GAS COMPANY

## Constructors of Coal Gas Apparatus.

EASTERN AGENTS FOR

**BREDEL'S SYSTEM**
COAL GAS PLANTS AND GAS APPARATUS.

**P. H. & F. M. ROOTS CO.'S**
Exhausters, Governors, etc.

GENERAL AGENTS FOR

**BRONDER'S CHARGING AND DISCHARGING MACHINES.**

## AMERICAN GAS COMPANY,

**222 South Third Street, Philadelphia, Pa.**

# FRED. BREDEL, C.E.

## Coal and Water Gas Plants.

**OWN SYSTEM.**

RECUPERATIVE FURNACES, WASHERS, CONDENSERS, PURIFIERS, PURIFYING MACHINES, COKE CONVEYERS, ETC.

SOLE UNITED STATES AGENT FOR
ARROL-FOULIS MECHANICAL CHARGING AND DRAWING MACHINES.

Gas Enriching Plants to Enrich Coal Gas up to 24 Candle Power, and Making a White, Bright, Non-smoking Gas.

**GAS RETORTS AND SPECIAL BLOCKS AND FIREBRICK MANUFACTURED UNDER THE SUPERINTENDENCE OF MY OWN CHEMIST.**

COMPLETE GAS WORKS

**No. 118 Farwell Avenue, · Milwaukee, Wis.**

**Eastern Agents: AMERICAN GAS CO., Construction Department, 222 So. 3d St., Phila., Pa.**

# ROOTS'

## LATEST IMPROVED GAS EXHAUSTER

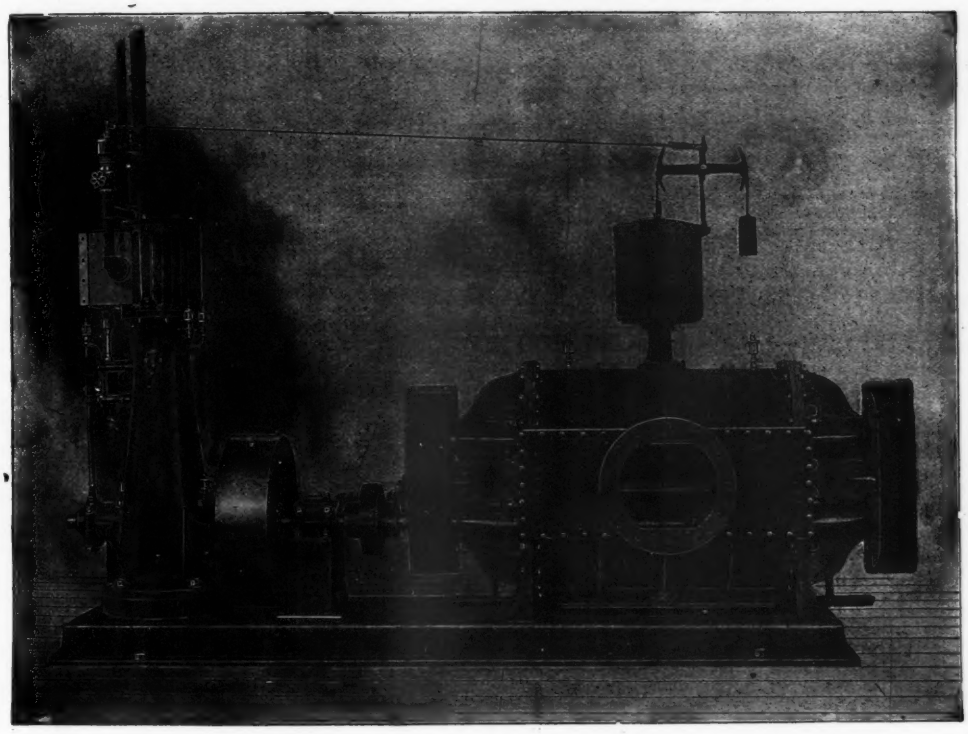
—AND—

## NEW GAS GOVERNOR AND STEAM VALVE.

GUARANTEED TO REGULATE WITHIN ONE-TENTH OF AN INCH, WATER PRESSURE.

## The Most Perfect Gas Governor on the Market.

MORE DIRECT IN ACTION. FEWER PARTS.
EASIER TO ADJUST THAN ANY OTHER GOVERNOR.



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## P. H. & F. M. ROOTS CO.,

Connersville, Ind. 109 Liberty St., New York.

Eastern Office:

## American Gas Company,

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**WARREN FOUNDRY AND MACHINE CO.,**

Established 1856. Works at Phillipsburgh, N. J.

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CAST IRON WATER AND GAS PIPE,

From Three to Forty-Eight Inches Diameter. Also, all Sizes of

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

"Lord Specials" "Lenoregan" Fire Hydrants

**M. J. DRUMMOND & CO.**

MANUFACTURERS OF

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GAS and WATER PIPE

GENERAL SALES OFFICE, 192 BROADWAY, NEW YORK.

Western Office: Monadnock Block, Chicago, Ill.

GEORGE ORMROD, Manst. & Treas., Emaus, Pa.
JOHN DONALDSON, Prest., Betz Bldg., Phila., Pa.

**EMAUS PIPE FOUNDRY.**

DONALDSON IRON COMPANY. EMAUS, PA.

CAST IRON GAS & WATER PIPE

MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP PONTS, Etc.

**CHARLES MILLAR & SON CO., Selling Agents, Utica, N.Y.**

Flanged Pipe and Fittings, Hydrants, Gates, Plug Lead, Jute, etc.

UTICA PIPE FOUNDRY CO.

Manufacturers of Lead Pipe, Solder, Traps and Bends and Plumbers' and Tinners' Goods.

**CAST IRON PIPE and SPECIALS FOR WATER AND GAS.**

Wholesale Eastern Agents AKRON VITRIFIED SEWER PIPE.

CORNELL & UNDERHILL,

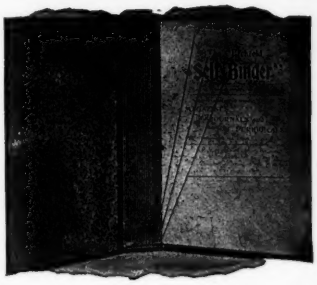
**Wrought & Cast Iron Pipe,**

MALLEABLE AND CAST IRON FITTINGS,

Brass and Iron Cocks and Gate Valves,

43, 45 AND 47 BEACH ST., NEW YORK.

**BINDER for the JOURNAL.**



Price, $1.00.

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PROPRIETORS

# THE NOVELTY STEAM BOILER WORKS,

**BROOKLYN, N. Y.**

## STORAGE TANKS FOR GAS WORKS,

To Retain Fluid Material of Any Sort.

## PIPING IN AND AROUND GAS WORKS.

Work Done for Several of the Largest Gas Companies in America Stands as Reference.

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ESTABLISHED 1836. INCORPORATED 1865.

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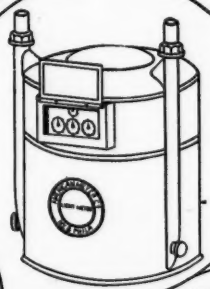
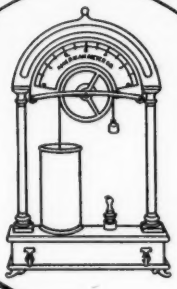
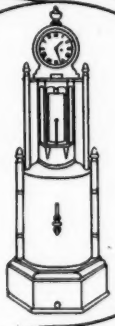
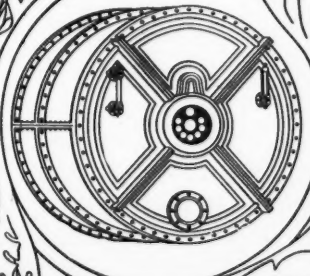
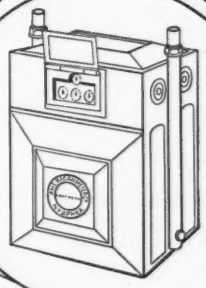
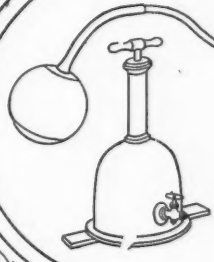


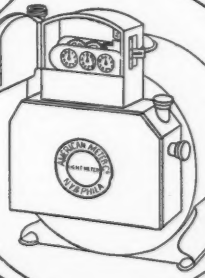












## PUBLIC LIGHTING TABLE.

### SEPTEMBER, 1900.

| Day of Week. | Date. | Table No. 1. Following the Moon. Light. | Table No. 1. Following the Moon. Extinguish. | Table No. 2. New York City. All Night Lighting. Light. | Table No. 2. New York City. All Night Lighting. Extinguish. |
|---|---|---|---|---|---|
| | | | | P.M. | A.M. |
| Sat. | 1 | 9.20 PM FQ | 4.20 AM | 6.30 | 4.20 |
| Sun. | 2 | 10.10 | 4.30 | 6.30 | 4.20 |
| Mon. | 3 | 11.10 | 4.30 | 6.15 | 4.30 |
| Tue. | 4 | 12.10 AM | 4.30 | 6.15 | 4.30 |
| Wed. | 5 | 1.20 | 4.30 | 6.15 | 4.30 |
| Thu. | 6 | 2.30 | 4.30 | 6.15 | 4.30 |
| Fri. | 7 | No L. | No L. | 6.15 | 4.30 |
| Sat. | 8 | No L. FM | No L. | 6.15 | 4.30 |
| Sun. | 9 | No L. | No L. | 6.15 | 4.30 |
| Mon. | 10 | 6.40 PM | 7.50 PM | 6.05 | 4.40 |
| Tue. | 11 | 6.40 | 8.30 | 6.05 | 4.40 |
| Wed. | 12 | 6.40 | 9.10 | 6.05 | 4.40 |
| Thu. | 13 | 6.40 | 10.00 | 6.05 | 4.40 |
| Fri. | 14 | 6.40 | 10.50 | 6.05 | 4.40 |
| Sat. | 15 | 6.40 LQ | 11.50 | 6.05 | 4.40 |
| Sun. | 16 | 6.30 | 12.50 AM | 6.05 | 4.40 |
| Mon. | 17 | 6.30 | 1.50 | 5.55 | 4.50 |
| Tue. | 18 | 6.30 | 2.50 | 5.55 | 4.50 |
| Wed. | 19 | 6.30 | 3.40 | 5.55 | 4.50 |
| Thu. | 20 | 6.30 | 4.50 | 5.55 | 4.50 |
| Fri. | 21 | 6.30 | 4.50 | 5.55 | 4.50 |
| Sat. | 22 | 6.30 | 4.50 | 5.55 | 4.50 |
| Sun. | 23 | 6.20 NM | 4.50 | 5.55 | 4.50 |
| Mon. | 24 | 6.20 | 4.50 | 5.40 | 5.00 |
| Tue. | 25 | 6.20 | 4.50 | 5.40 | 5.00 |
| Wed. | 26 | 6.20 | 4.50 | 5.40 | 5.00 |
| Thu. | 27 | 6.20 | 4.50 | 5.40 | 5.00 |
| Fri. | 28 | 7.20 | 4.50 | 5.40 | 5.00 |
| Sat. | 29 | 8.00 | 4.50 | 5.40 | 5.00 |
| Sun. | 30 | 9.00 | 5.00 | 5.40 | 5.00 |

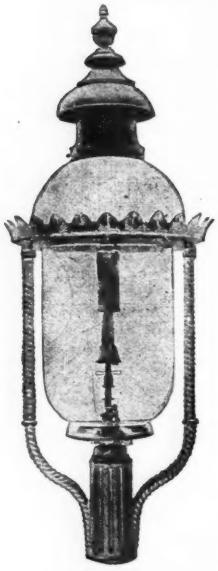
### TOTAL HOURS LIGHTING DURING 1900.

| By Table No. 1. | Hrs.Min. | By Table No. 2. | Hrs.Min. |
|---|---|---|---|
| January | 230.50 | January | 423.20 |
| February | 175.40 | February | 355.25 |
| March | 189.00 | March | 355.35 |
| April | 160.30 | April | 298.50 |
| May | 150.40 | May | 264.50 |
| June | 137.00 | June | 234.25 |
| July | 152.00 | July | 243.45 |
| August | 171.50 | August | 280.25 |
| September | 187.20 | September | 321.15 |
| October | 213.10 | October | 374.30 |
| November | 221.50 | November | 401.40 |
| December | 231.50 | December | 433.45 |
| Total, yr | 2221.40 | Total, yr | 3987.45 |

NEW YORK, 33 Nassau St. PHILADELPHIA, Broad and Arch Sts. CHICAGO, 54 Lake St.

# Welsbach Street Lighting Company

.... OF AMERICA ....



No. 36.

Controls and Operates the

## Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in seventy-five Cities and Towns.

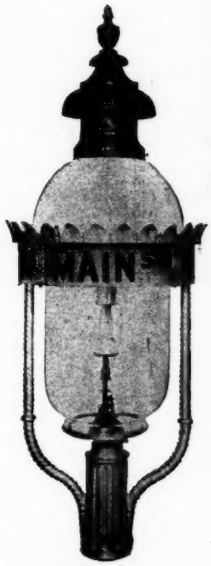
By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.




No. 38.

Correspondence solicited from Gas Companies and others interested in Municipal and outside lighting.

# Welsbach Famous Mantles.

THE INCOMPARABLE

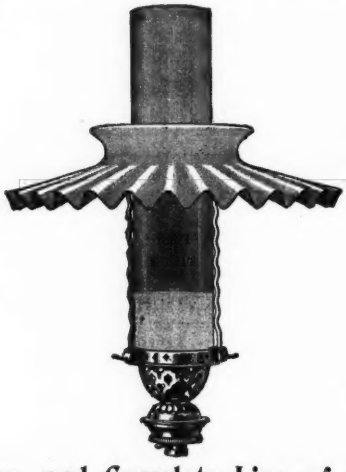
"Yusea" Welsbach Mantle

FINEST EXAMPLE

OF INCANDESCENT

GAS LIGHT

EVER EXHIBITED.



OTHER

WELSBACH BRANDS

—OF—

Magnificent Brilliancy

—AND—

Endurance.

THE HIGHEST ILLUMINATION,

The Lowest Cost.

Welsbach Lamps, Mantles, and Complete Line of Glassware and Supplies

# WELSBACH COMPANY,

GLOUCESTER, N. J.

Chicago Branch Department and Supply House, - - - - - 70 Wabash Avenue.

# THE UNITED GAS IMPROVEMENT COMPANY.

THE STANDARD JUNIOR,

THE STANDARD DOUBLE SUPERHEATER,

LOWE WATER GAS APPARATUS.

Total Sets Installed to January 1, 1900, - - - - - - - - 327

Total Daily Capacity - - - - - - - - - 207,425,000 Cu. Ft.

WATER GAS PLANT AS AUXILIARY TO COAL GAS WORKS.

## The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY Prest. DAVID R. DALY V. Prest. & Treas.
H. D. ABERNETHY, Sec.

**J. H. Gautier & Co.**

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES,
FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

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**Brooklyn Fire Brick Works,**

MANUFACTURERS OF

CLAY RETORTS, FIRE BRICK,
Gas House and other Tile.

Office, 88 Van Dyke St. Brooklyn, N. Y.

Established 1854. Incorporated 1869.

**LACLEDE**
**Fire Brick Manufg. Co.,**

Manufacturers of { GAS RETORTS . .
FIRE BRICK . . .
RETORT SETTINGS

Water Gas Cupola Linings, Fire Clay, Etc.

Proprietors for the U. S., Coze System of Inclined Benches.

*Estimates Furnished on Application for Most Successful Style of Construction.*

Also for Free-Firing and Full and Half-Depth Regenerative Benches, for Burning either Coal or Coke in the Furnaces.

Office: 914, 915 & 916 Wainwright Building, St. Louis, Mo.

**The Construction of Gas Works**

PRACTICALLY DESCRIBED,

By WALTER RALPH HERRING.

Price $2. For Sale by

A. M. CALLENDER & CO.,

32 Pine Street, N. Y. City.

**Adam Weber,**

Proprietor,

Manhattan Fire Brick and Enameled Clay Retort Works.

**Works, Weber, N. J.**

Office, 633 East 15th St., New York.

Modern Recuperative Furnaces

And Standard Fire Brick and Gas Retorts.

Works, LOCKPORT STATION, PA.

—ESTABLISHED 1864.—

**JAMES GARDNER, JR., CO.,**

Hamilton Building, Fifth Avenue, PITTSBURGH, PA. P. O. Box 373.

Successor to WILLIAM GARDNER & SON,

**Fire Clay Goods for Gas Works.**

SOLE REPRESENTATIVE OF THE McILHENNY REGENERATIVE BENCHES FOR THE U. S.

**HENRY MAURER & SON,**

(ESTABLISHED 1856.)

EXCELSIOR FIRE BRICK & CLAY

**RETORT WORKS**

WORKS, Perth Amboy, N. J.

OFFICE, 418 to 422 East 23d St., N. Y.

**Clay Gas Retorts,**

BENCH SETTINGS,

Fire Brick, Tiles, Etc.

**GEROULD'S IMPROVED RETORT CEMENT**

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

*Price List, f.o.b. Galesburg or Brooklyn.*

In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD, Galesburg, Ills.

Eastern Agent, GEO. P. WARRINER, 675 Bedford Ave., BROOKLYN, N. Y.

**Parker-Russell Mining and Mfg. Co.,**

CITY OFFICE,
417 Pine Street, St. Louis, Mo.

PROPRIETORS OF THE

OAKHILL GAS RETORT & FIRE BRICK W'KS

Our immense establishment is now employed almost entirely in the manufacture of

**Materials for Gas Companies**

We have studied and perfected three important points. Our retorts are made to stand changes of temperature, the strongest heats of the furnace, and the abrasion of feeding and emptying. We construct

Half and Full Depth Benches of Our Own Design,

Containing 6, 8 or 9 Retorts.

We have Greatly Improved our Recuperators. Coal or Coke can be used as Fuel in Furnaces.

THEO. J. SMITH, Prest. J. A. TAYLOR, Sec.
A. LAMBLA, Vice-Prest. and Supt.

**BALTIMORE**

**RETORT & FIRE BRICK CO.**

MANUFACTORY AT

LOCUST POINT BALTIMORE MD.

**Clay Retorts, Blocks & Tiles**

FIRE BRICK, FIRE CLAY,
AND FIRE CEMENT.

Red and Buff Ornamental Tiles and Chimney Tops. Baker Oven Tiles 12 x 12 x 2 and 10 x 10 x 2.

WALDO BROS., 103 MILK ST., BOSTON, MASS.

Sole Agents for New England States.

JOHN DELL, General Manager.

**MISSOURI FIRE BRICK CO.,**

ESTABLISHED 1882.

MANUFACTURERS OF

**Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.**

We are prepared to furnish and erect COMPLETE, Half and Full Depth Benches of 6's, 8's, 9's, with Regenerative Furnaces, Constructed to Burn either Coal or Coke. Also Plain Benches.

CORRESPONDENCE IS RESPECTFULLY SOLICITED.

{ CITY OFFICE: 411 Olive St., Continental Bank, } ST. LOUIS, MO.

# National Gas and Water Company.

CONTRACTORS FOR
**Gas Plant Machinery**

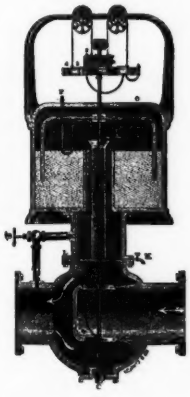
SOFT COAL OR COKE
WATER GAS GENERATORS
A SPECIALTY.

218 LA SALLE ST.,
CHICAGO.

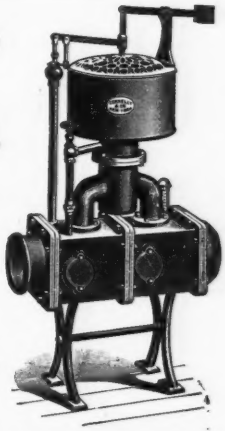
**Gas Engineers**
INSPECTION AND ADVICE.

PLANS AND ESTIMATES
FOR IMPROVEMENTS OR
REPAIRS.

# GAS WORKS SPECIALTIES,



AUTOMATIC STREET GAS GOVERNORS,
BALANCE GAS GOVERNORS.
"Iron Sponge" and Natural Oxide
FOR GAS PURIFICATION.
EXHAUSTERS, ETC.



## Connelly Iron Sponge & Governor Co.

No. 357 CANAL STREET,
NEW YORK CITY.

WESTERN BRANCH CONNELLY IRON SPONGE & GOVERNOR CO.,
788 South Canal Street, Chicago, Ills.

## Hughes'
## "Gas Works,"

**Their Construction and Arrangement,**

**And the Manufacture and Distribution of Coal Gas.**

Originally written by SAM'L HUGHES, C.E.

Rewritten and Much Enlarged by
WM. RICHARDS, C.E.

Eighth Edition, Revised, with Notices of Recent Improvements.

**Price, $1.65.**

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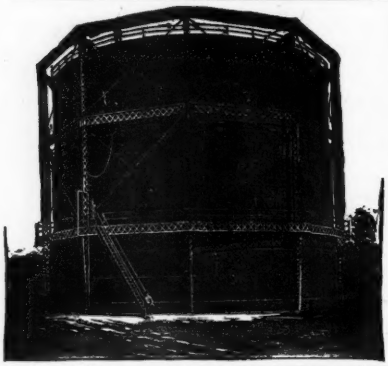

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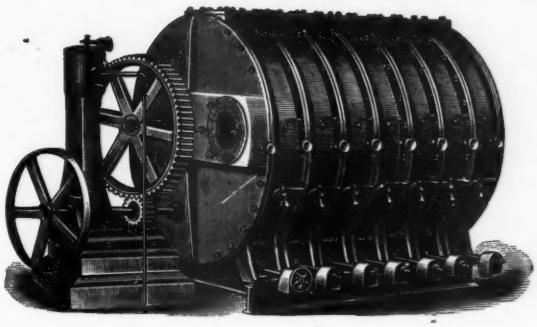

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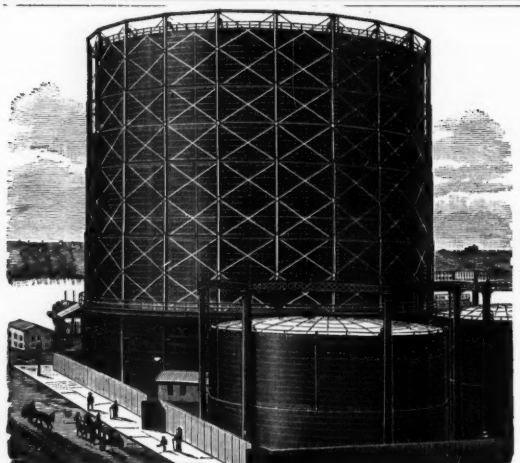

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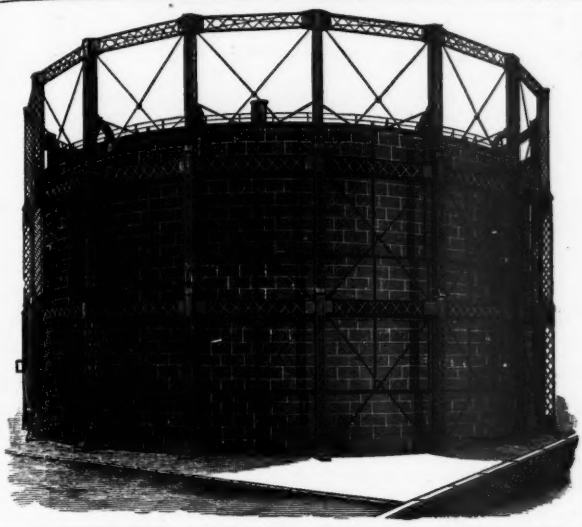

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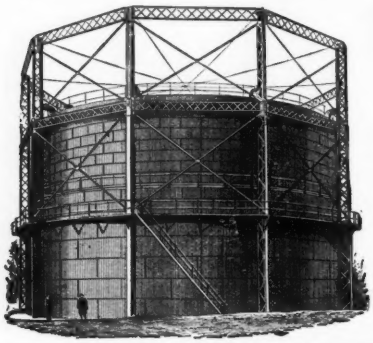

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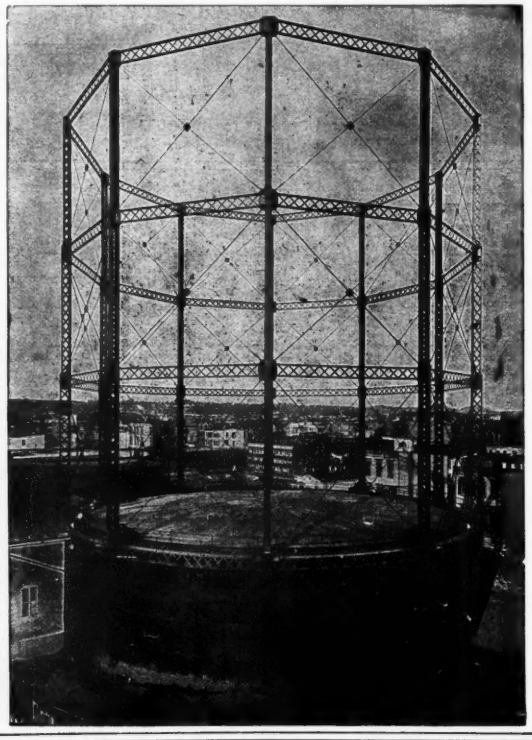

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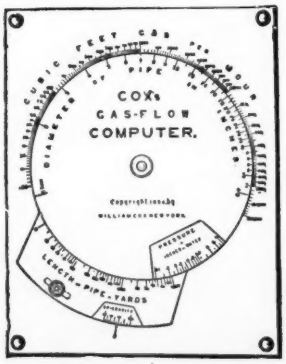


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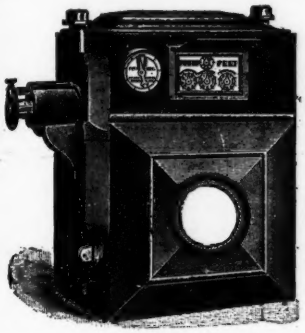

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**The BUHL METERS are as good Meters as you can get.**

DETROIT METER COMPANY, - - Detroit, Mich.

The Advertisement of

**JOHN J. GRIFFIN & CO., Mfrs. of Gas Meters, etc.,**

Nos. 1513, 1515, 1517, 1519 & 1521 Race Street, Philadelphia,

52 Dey Street, New York, 75 N. Clinton Street, Chicago,

Occupies this space every alternate week.

# The Western Gas Construction Company's

## IMPROVED SYSTEM

OF

## COAL GAS APPARATUS

Has been or is under contract to be installed COMPLETE at

**Spokane, Wash.**
**Butte, Mont.**
**Peoria, Ills.**
**Evanston, Ills.**
**Schenectady, N. Y., Reconstruction.**
**Racine, Wis.**
**Davenport, Iowa.**
**Moline, Ills., Reconstruction.**
**Valparaiso, Ind., Reconstruction.**
**Binghamton, N. Y.**
**Long Branch, N. J.**
**Durango, Col.**
**Defiance, O.**
**Charleston, Ills.**
**Waukegan, Ills.**

**FOR THE COMPLETE, PROGRESSIVE TREATMENT OF THE GAS FROM THE HYDRAULIC MAIN TO THE STATION METER,**

Comprising gradual condensation, extraction of tar without loss of illuminants, extraction of ammonia with large percentage of $CO_2$ and sulphur by thorough washing and completing the extraction of sulphur by purification, either in ordinary purifiers, or our **IMPROVED BEAL DUPLEX PURIFIERS or DOHERTY-BUTTERWORTH PATENT PURIFIERS,** giving double the capacity of ordinary purifiers on the same floor area.

This system is thoroughly protected by patents issued or applied for, and does not infringe any other Process or Patents, and in almost all instances **makes use of existing apparatus.**

We have also supplied our Tar Extracting and Washing Apparatus to a number of works for use in connection with existing equipment.

WILLIAM HENRY WHITE,
EASTERN ENGINEER,
**32 Pine St., New York.**

**The Western Gas Construction Co.,**
FORT WAYNE, IND.